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telecommunication journal

OFFICIAL ORGAN OF THE INTERNATIONAL TELECOMMUNICATION UNION

Journal des télécommunications
Boletín de Telecomunicaciones

DECEMBER 1963

Vol. 30 — No. 12

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HENRY R. CASSIRER
Television in developing countries. Its problems and potential contributions

Dr. R. L. SMITH-ROSE
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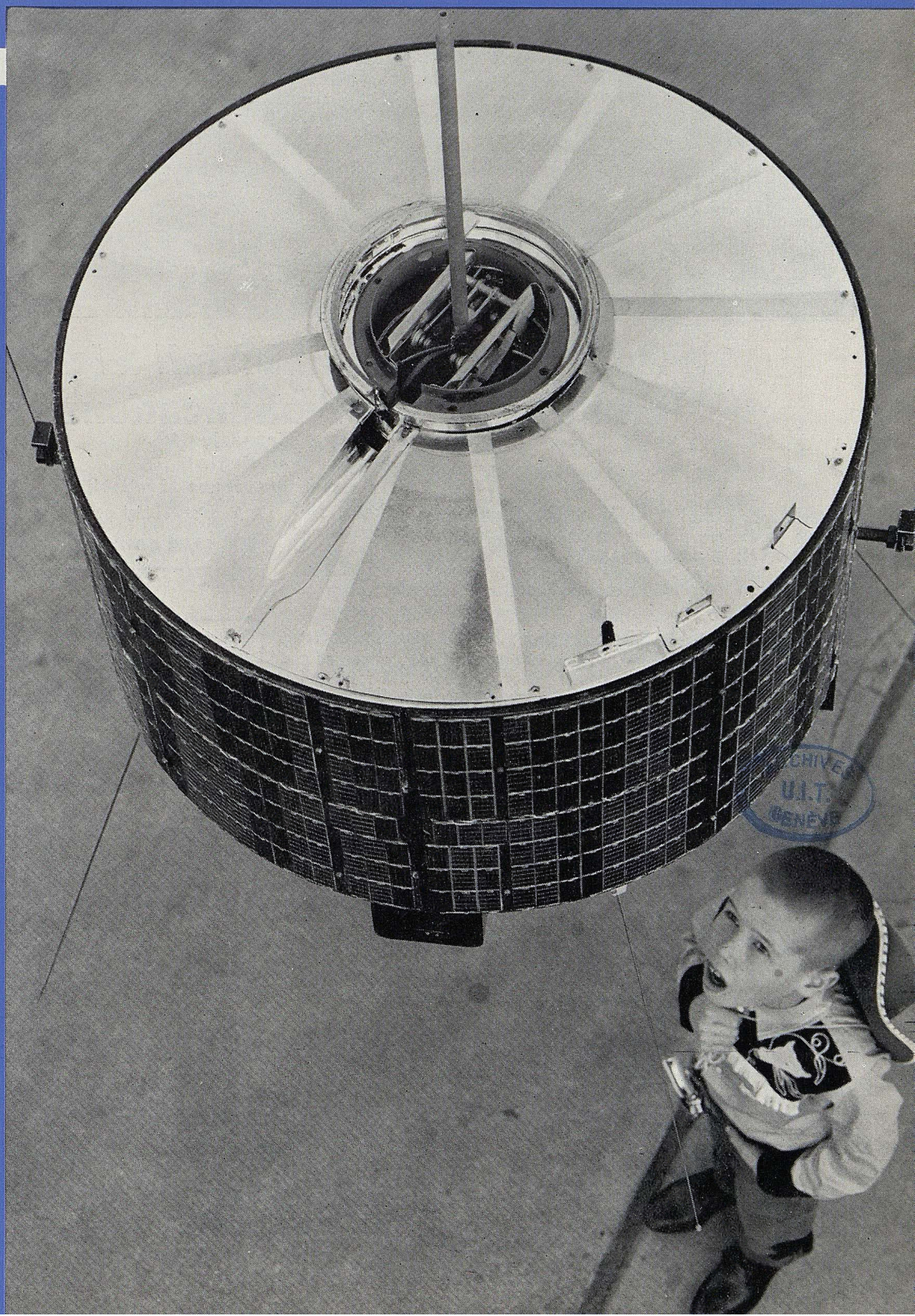
Telepersonality
No. 36 — Ashot Badalov

SYNCOM AND YOUNG ADMIRER —ONE WAY OF TRAINING THE ENGINEERS OF THE FUTURE

(Photo : Hughes Aircraft Company)



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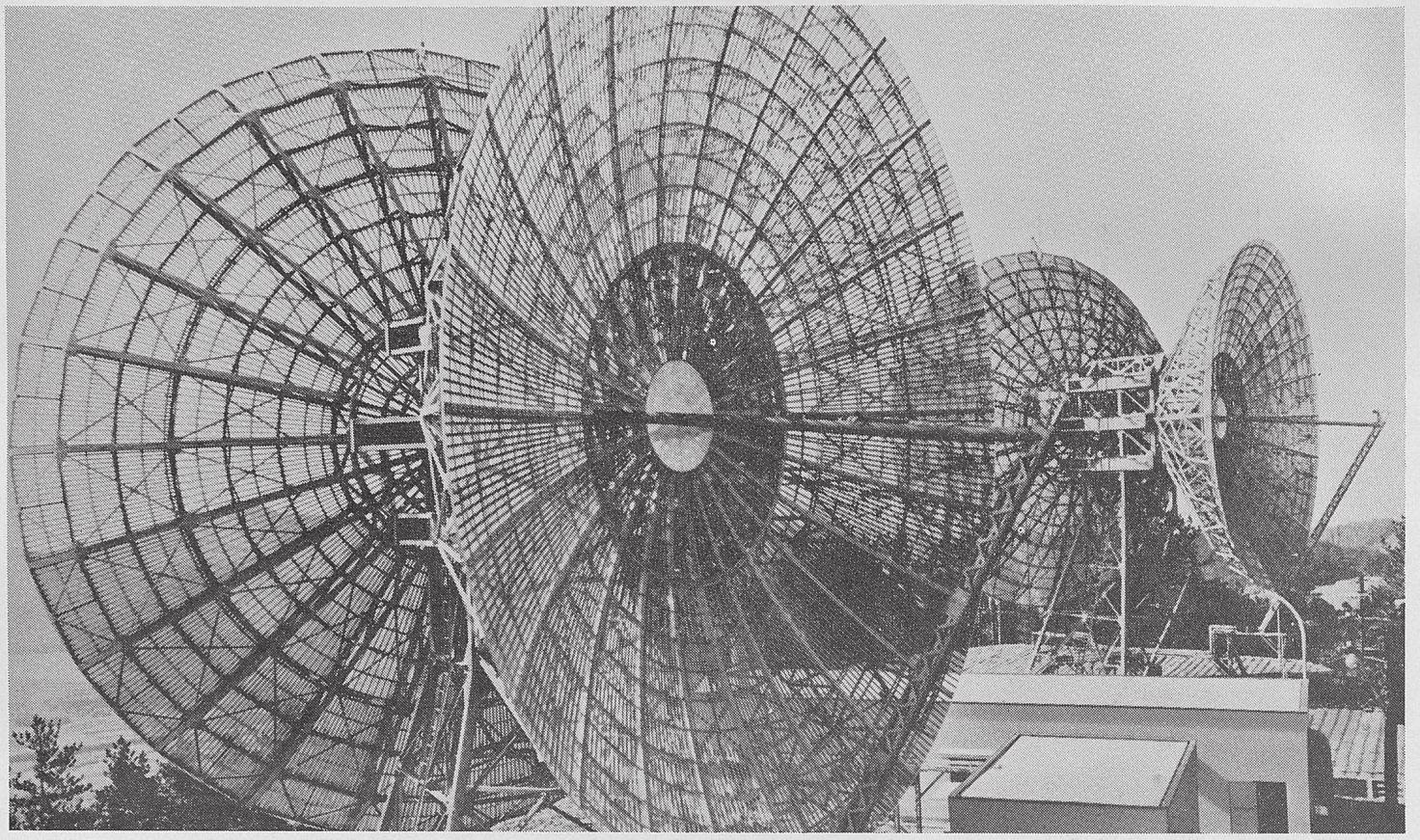
Read about the latest advances in O/H microwave technology



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1. NEC's *original* high-sensitivity receiver with compandor, employing a negative feedback phase detection system, improves S/N ratio and threshold level by 10 db over conventional FM receivers. This has the same effect in link design as a tenfold increase in transmitter power. (Patents have been obtained in such major countries as U.S.A., United Kingdom and West Germany.)
2. NEC's *newly refined* low-noise parametric amplifier improves noise figure to 3 db.
3. NEC's *newly perfected* angular diversity system halves the number of antennas required by conventional systems, resulting in great savings in both equipment and installation costs.
4. NEC's *newly designed* pre-detection ratio-square combiner improves S/N ratio and decreases distortion in telephone and television relays over conventional combiner.

Components with special features abound in NEC's O/H systems; e.g.:

1. Constant impedance branching filter with hybrid circuits and filters.
2. Parallel push-pull hybrid circuit, which provides four excitation inputs for simultaneous combination after amplification.
3. Circulator, which is a type of non-reciprocal device using ferromagnetic materials; and a permanent magnet that transmits microwaves cyclically in a fixed direction.
4. Oil-filled high-voltage power supply.
5. Ceramic-sealed high-power lighthouse tubes with unique characteristics.
6. A variety of high-power klystron tubes.

NEC O/H communications systems summarized

SYSTEM	O/H 2000	O/H 900	O/H 900V	O/H Tr 2000 (transistorized and transportable)
Channel Capacity	120 ch	120 ch	TV 1 ch	120 ch
Frequency Band	1700—2300 Mc	700—950 Mc	700—950 Mc	1700—2300 Mc
Relaying System	Base band	Base band	heterodyne	Base band
Output Power	100W, 400W 1kW, 10kW, 15kW	500W	500W	1 kW
Order of Diversity	Dual, quadruple, octuple			
Diversity System	Frequency, space, angular			
Noise Figure	3 db with parametric amp.; 7.5 db without parametric amp.	3.5 db with parametric amp.; 7.5 db without parametric amp.	3.5 db with parametric amp.; 8 db without parametric amp.	5 db with tunnel diode amp.

NEC O/H equipment now installed covers a total of 218, 404 channel-miles.

Patent Numbers Granted: ☐ U.S.A.—3,001,068 & 3,069,625 ☐ Canada—653,856 & 640,291 ☐ West Germany—1,071,160 ☐ United Kingdom—833,390 & 911,495 ☐ France—1,209,602 & 1,222,053 ☐ Other countries—pending

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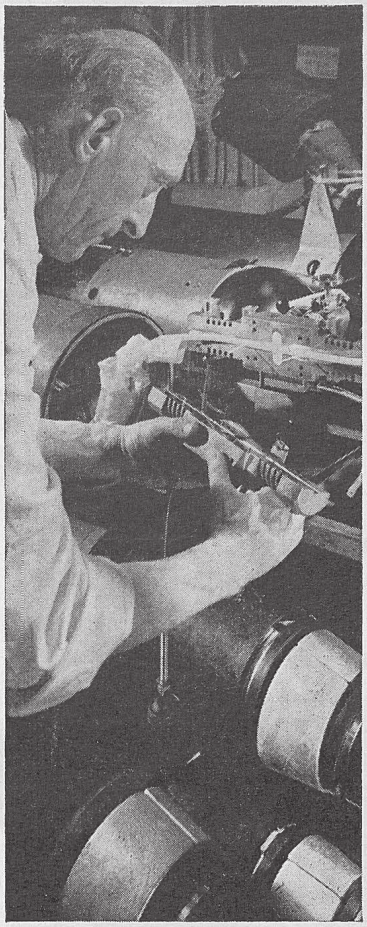

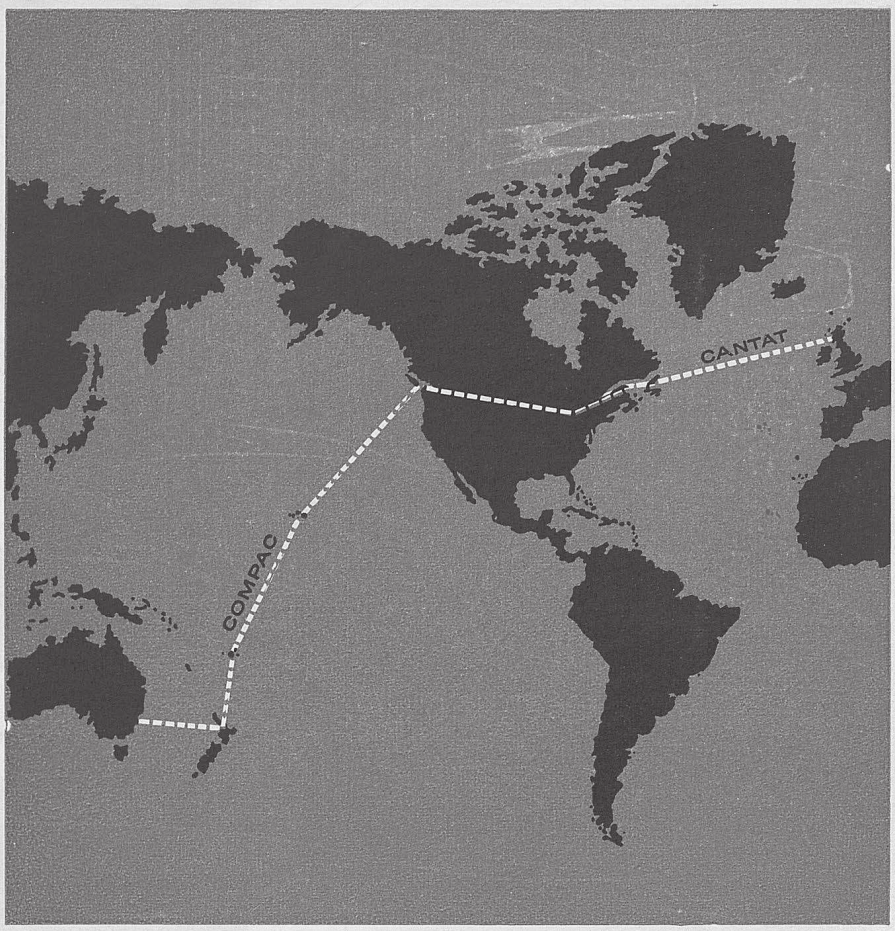

VITAL LINKS in the longest submarine cable telephone system in the world: 231 STC submarine repeaters have been spliced into the Commonwealth Pacific (COMPAC) submarine cable now in service between Sydney and Vancouver. Of the 76 high-quality telephone circuits terminating in Sydney, 12 are connected directly with London through the Canadian microwave network and the North Atlantic cable (CANTAT). Other STC contributions to COMPAC include 2 800 nautical miles of cable, 38 submerged equalizers and a considerable quantity of terminal equipment. The total number of STC submerged amplifiers in operation between Australia and London is 321. Picture shows an STC installation engineer, on board ship, splicing a repeater into the cable. Standard Telephones and Cables Limited, Submerged Repeater Division, Transmission Systems Group, North Woolwich, London, E.16, England. An associate of ITT.

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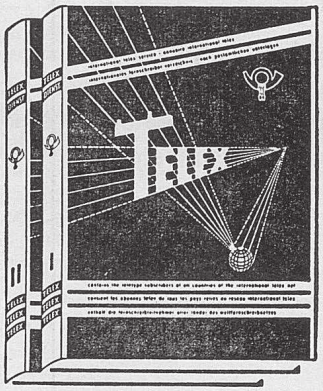

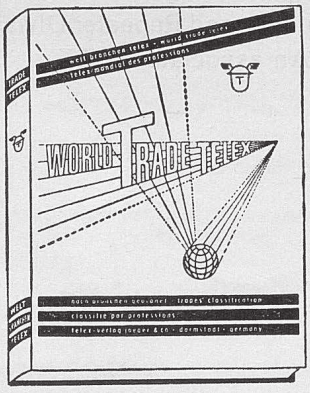

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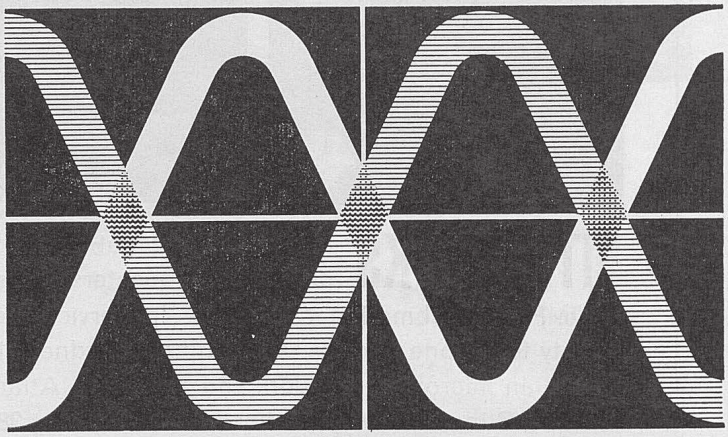

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In addition,two systems will be provided using U.H.F. microwave radio equipment operating in the 2000 Mc/s frequency band. These are between Michalakades and Kerkyra and between Thyrrion and Agrinion. Again,two radio channels will be provided on each route with automatic changeover in the event of failure or degradation of the working channel.

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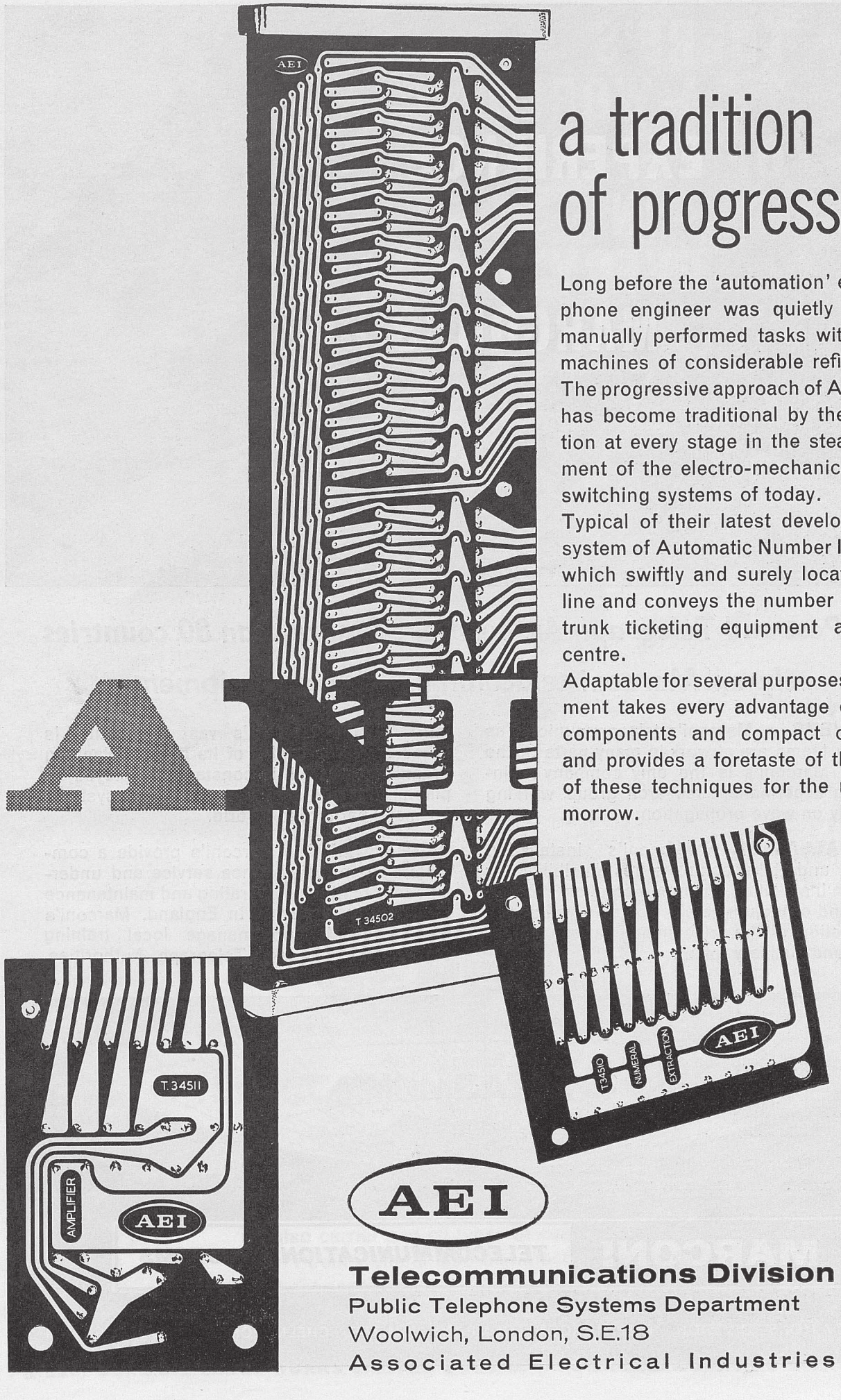

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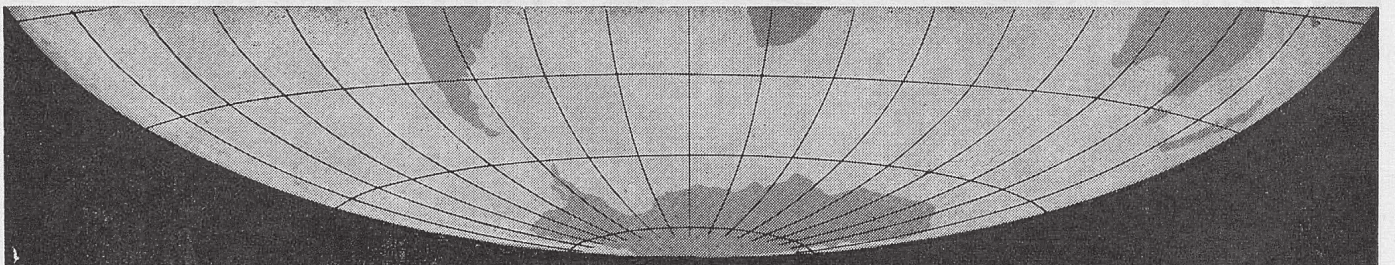

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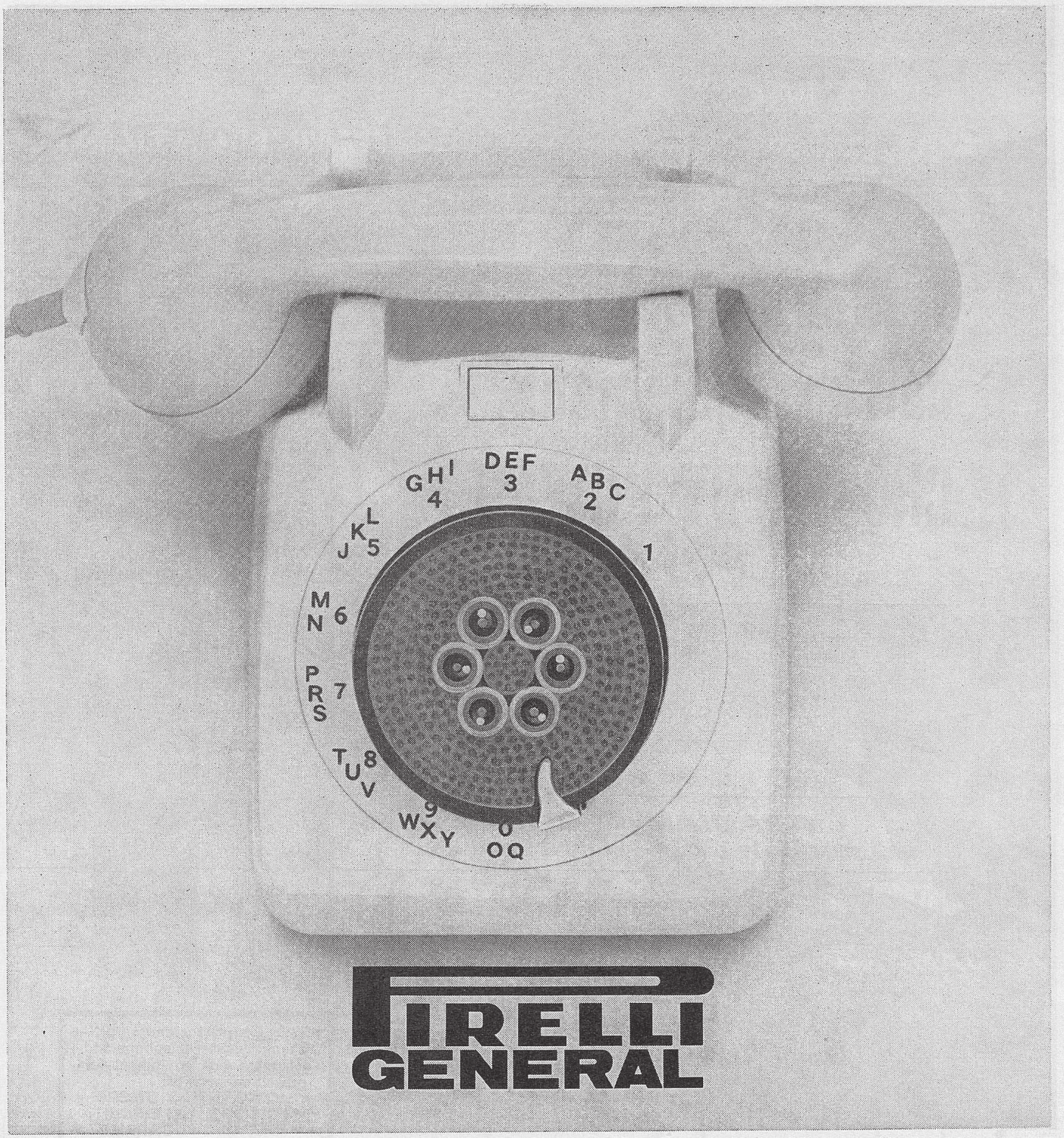

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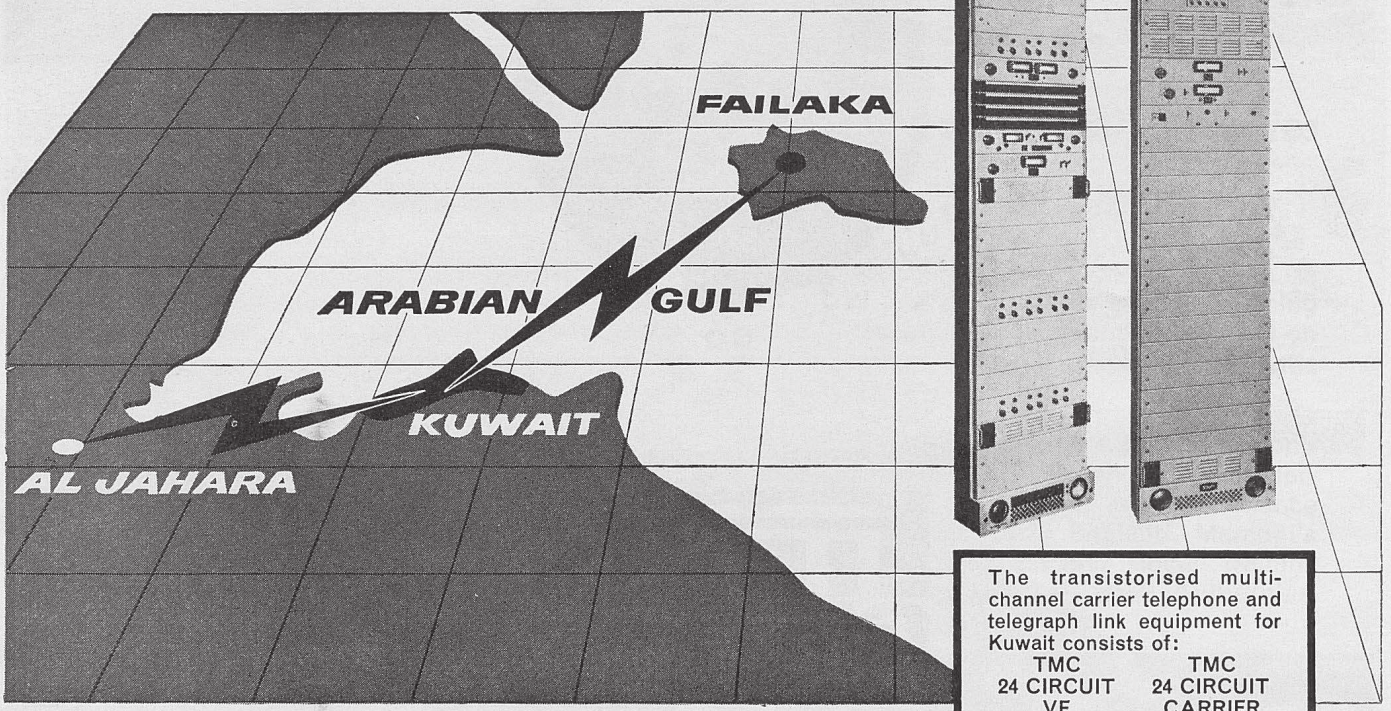

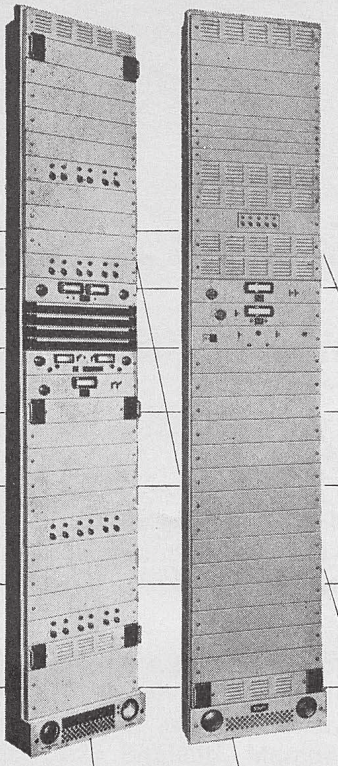

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For important trunk connections between Al Jahara, Kuwait and Failaka, the Kuwait Ministry of Posts, Telegraphs and Telephones selected these TMC terminals. The equipment is ideally suitable for reliable and economical service over a long working life under arduous climatic conditions.

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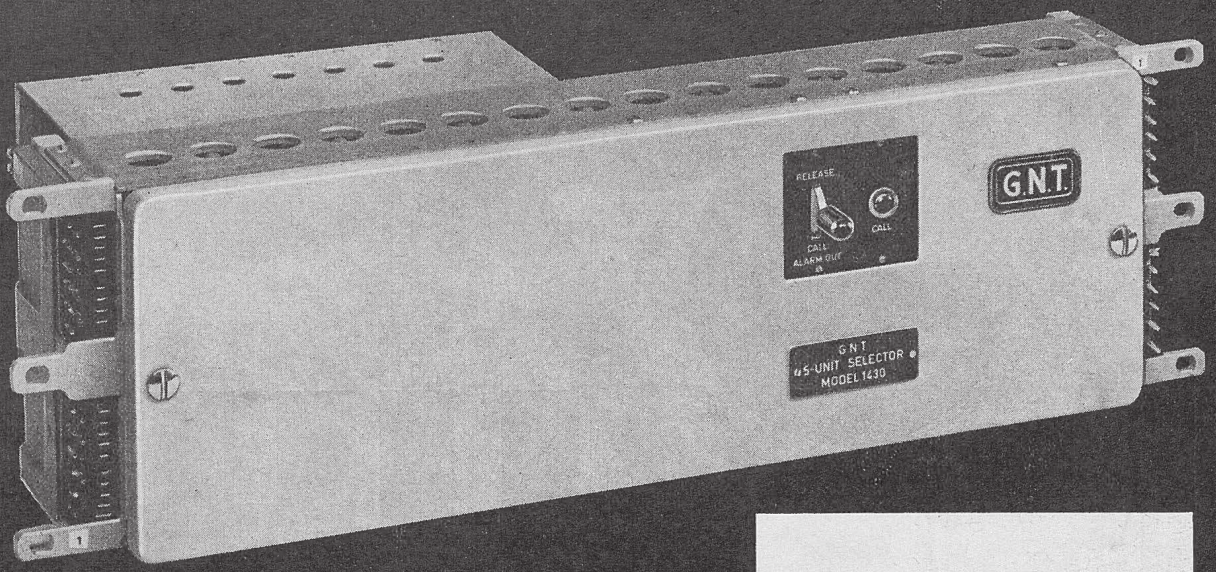

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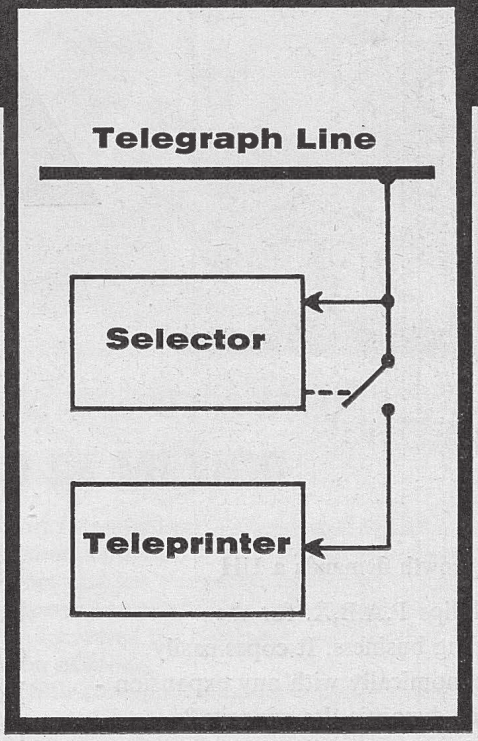

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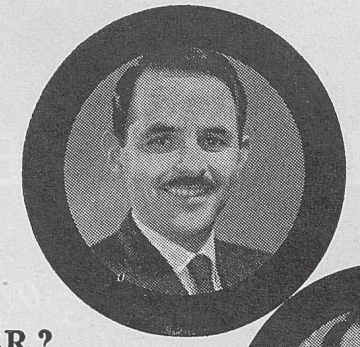

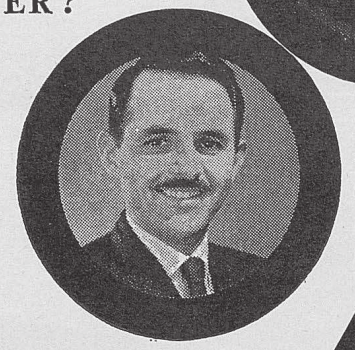

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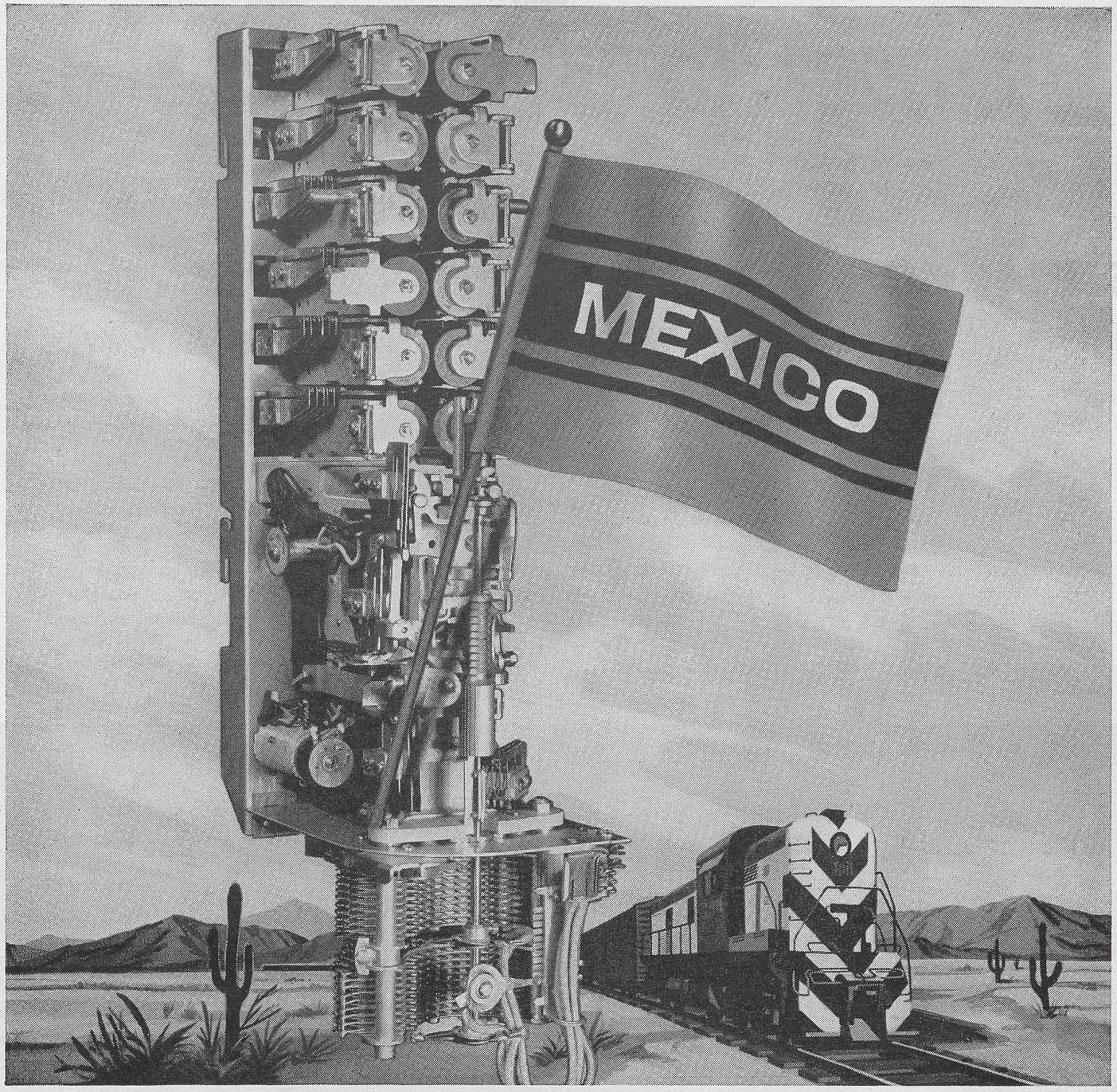

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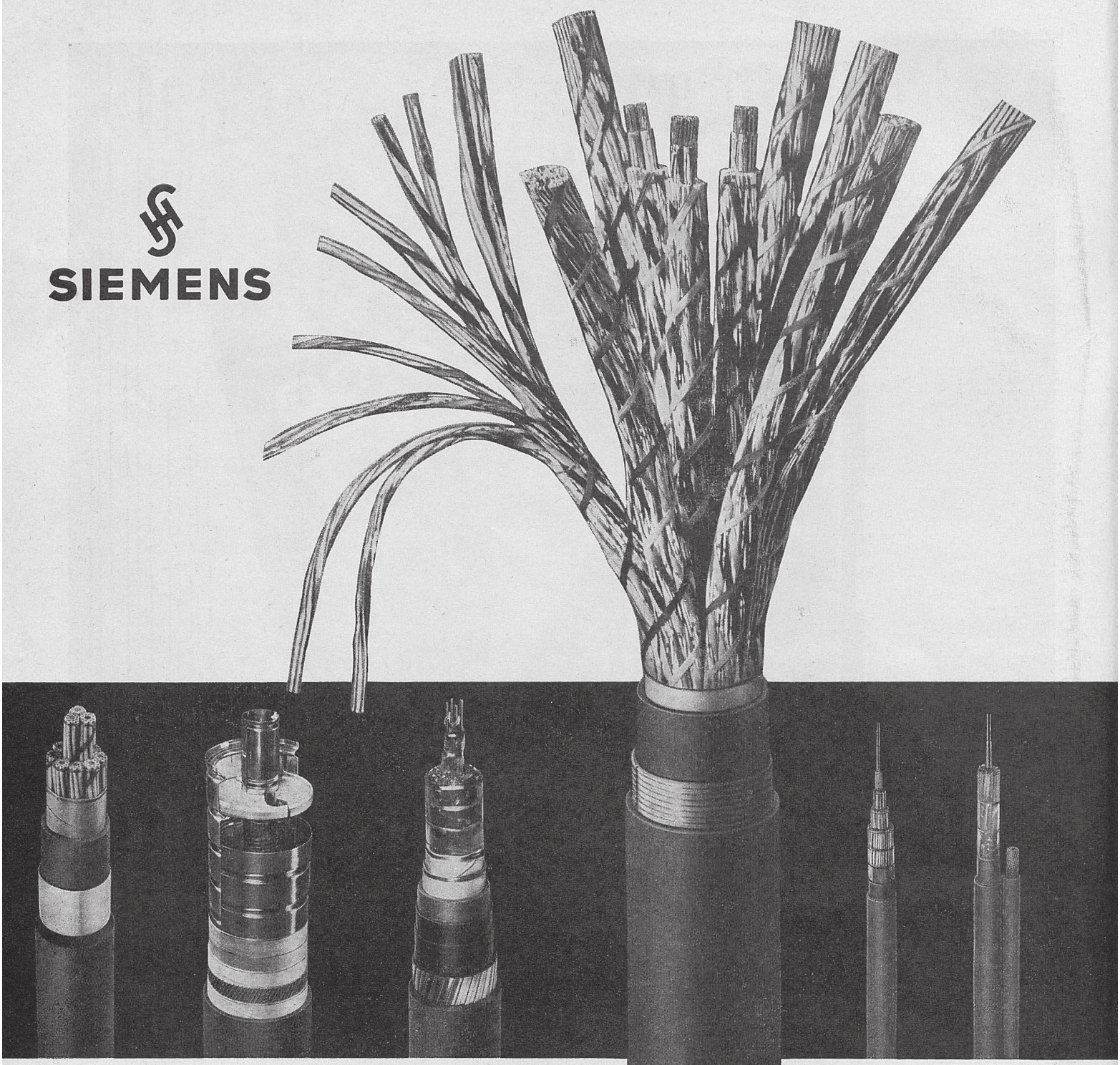

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TOWARDS THE STARS

" The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings."

When, nearly four hundred years ago, Shakespeare put this eloquent piece of common sense into the mouth of Cassius in Julius Caesar, *he was spurning a superstition that has paralyzed men's outlook for countless generations—the belief that their fate was controlled by a mysterious agency governing their lives from birth which they looked up to the sky and called their star. The symbolism of the stars has never quite lost its hold on men's hopes and fears. Even to-day, we talk of our " lucky star."*

We have nevertheless come to realize nowadays that we cannot shrug off responsibility for what we are onto bodies twinkling in outer space. The " fault ", and much else besides, is " in ourselves." And, along with this growing sense of realism—indeed partly inspiring it—is the march of twentieth century science, unmasking for us knowledge of things hitherto hidden from all man's mental faculties save his imagination. Among the things which science is bringing directly to our knowledge are the outer reaches of the universe.

The Space Radiocommunication Conference, which ended in Geneva on 9 November, and the detailed results of which are given in our News section, was by any standards and by common consent a highly successful meeting. To have enlarged the allocations for outer space activities from 1 % to 15 % of the Table of Frequency Allocations, to have found a total of 2800 Mc/s for communication satellites, to have transformed a vast complex of different proposals into an orderly pattern of detailed practical results (the allocation of a distress frequency for space, for example, which notably caught the public eye)—all this represents a monumental achievement in terms of international co-operation.

But future historians may well regard the most far-reaching outcome of the Conference to have been the allocations that were made for Space Research and Radio Astronomy. No one who was present can fail to have missed the significance of Dr. Smith-Rose's words when he thanked the Conference for having released the 1400-1427 Mc/s hydrogen line band to Radio Astronomy on an exclusive basis. For those who build the craft for Space Research and those who wait tensely by their radio telescopes are seeking out for the vital needs of human knowledge the truth about those distant orbs towards which man could only previously direct his eyes in picturesque belief or groping speculation,—the stars, most of them as far beyond the range of man's eyes as the visible ones have ever been beyond the range of his destiny.

C. M.

headquarters

RADIO CONFERENCE ON SPACE COMMUNICATIONS

REWARDING RESULTS

With the signing of the Final Acts on Friday, 8 November, at midnight Geneva time, the Space Radiocommunication Conference, convened by the International Telecommunication Union (ITU), which had been meeting in Geneva's Bâtiment Electoral for five weeks, completed its work.

The main task of the Conference, which was attended by more than four hundred delegates from seventy ITU Member countries, has been the allocation of radio frequencies for outer space activities and the consequent revision of the Table of Frequency Allocations. Since the Geneva Radio Conference of 1959, the allocation of an adequate number of frequencies for outer space had become an urgent task, due to the rapid growth of activity in space.

The Conference finally allocated, on a shared or exclusive basis, frequencies totalling 6076.462 Mc/s for the various kinds of space services and for radio astronomy, 2800 Mc/s of which are for communication satellites on a shared basis with other services. Thus, while at the 1959 Conference only about 1 per cent of the Table of Frequency Allocations was made available for outer space, about 15 per cent has now been made available. *(See table on the right)*

The Conference also adopted a number of revisions and additions to other parts of the Radio Regulations, mainly concerned with general rules for the assignment and use of frequencies; notification and recording of frequencies in the Master International Frequency Register which is maintained by the International Frequency Registration Board (IFRB); the identification of stations; service documents; terms and definitions; and special rules relating to particular services. These revisions and additions were necessitated to make provision for the space services.

In addition, the Conference adopted a number of important Resolutions and Recommendations. One of these deals with the future action to be taken by the ITU in the light of future developments in space radiocommunications. It recommends that Members and Associate Members of the Union make data available to the appropriate permanent organs of the ITU; that the Administrative Council should annually review the

The delegates deposit their signed copies of the Final Acts before Mr. Gerald C. Gross, Secretary-general, at the left *(Photo: ITU)*

progress of Administrations in space radiocommunications and should, in the light of this review, recommend the convening of an Extraordinary Administrative Conference at a future date to work out further agreements for the international regulation of the use of the frequency bands allocated by the present Conference; and that notification and registration of frequency assignments to space services shall, until revised by a future Conference, be effected in accordance with the procedures adopted by the present Conference.

One of the most important Resolutions deals with space vehicles in distress or emergency, noting that the frequency of 20 007 kc/s had been set aside by the Conference for this purpose and resolving that for the time being the distress signal used by ships or aircraft (SOS in radio telegraphy and MAYDAY in radio telephony) should also be used by spacecraft.

Frequency Bands	Service
15 762-15 768 kc/s	Space Research (shared)
18 030-18 036 kc/s	Space Research (shared)
30.005-30.010 Mc/s	Space Research and Space (Satellite identification) (shared)
37.75-38.25 Mc/s	Radio Astronomy (shared)
73-74.6 Mc/s	Radio Astronomy (exclusive)
136-137 Mc/s	Space Research (Telemetering and tracking) (shared in Regions 1 and 3, exclusive in Region 2)
137-138 Mc/s	Meteorological-Satellite, Space Research (Telemetering and tracking), Space (Telemetering and tracking) (shared)
143.6-143.65 Mc/s	Space Research (Telemetering and tracking) (shared)
149.9-150.05 Mc/s	Radionavigation-Satellites (exclusive)
267-273 Mc/s	Space (Telemetering) (shared)
399.9-400.05 Mc/s	Radionavigation-Satellites (exclusive)
400.05-401 Mc/s	Meteorological-Satellites (Maintenance telemetering), Space Research (Telemetering and tracking) (shared)
401-402 Mc/s	Space (Telemetering) (shared)
460-470 Mc/s	Meteorological-Satellites (shared)
1400-1427 Mc/s	Radio Astronomy (exclusive)
1427-1429 Mc/s	Space (Telecommand) (shared)
1525-1535 Mc/s	Space (Telemetering) (shared)
1535-1540 Mc/s	Space (Telemetering) (exclusive)
1660-1670 Mc/s	Meteorological-Satellites (shared)
1664.4-1668.4 Mc/s	Radio Astronomy (shared)
1690-1700 Mc/s	Meteorological-Satellites (shared)
1700-1710 Mc/s	Space Research (Telemetering and tracking) (shared)
1770-1790 Mc/s	Meteorological-Satellites (shared)
2290-2300 Mc/s	Space Research (Telemetering and tracking in deep space) (shared)
2690-2700 Mc/s	Radio Astronomy (exclusive)
3400-4200 Mc/s	Communication-Satellites (Satellite-to-earth) (shared)
4400-4700 Mc/s	Communication-Satellites (Satellite-to-earth) (shared)
4990-5000 Mc/s	Radio Astronomy (shared in Regions 1 and 3, exclusive in Region 2)
5250-5255 Mc/s	Space Research (shared)
5670-5725 Mc/s	Space Research (Deep Space) (shared)
5725-5850 Mc/s	Communication-Satellites (Earth-to-satellite) (only in Region 1 and shared)
5850-5925 Mc/s	Communication-Satellites (Earth-to-satellite) (only in Regions 1 and 3 and shared)
5925-6425 Mc/s	Communication-Satellites (Earth-to-satellite) (shared in all Regions)
7250-7300 Mc/s	Communication-Satellites (Satellite-to-earth) (exclusive)
7300-7750 Mc/s	Communication-Satellites (shared)
7900-7975 Mc/s	Communication-Satellites (Earth-to-satellite) (shared)
7975-8025 Mc/s	Communication-Satellites (Earth-to-satellite) (exclusive)
8025-8400 Mc/s	Communication-Satellites (Earth-to-satellite) (shared)
8400-8500 Mc/s	Space Research (shared in Regions 1 and 3, exclusive in Region 2)
10.68-10.7 Gc/s	Radio Astronomy (exclusive)
14.3-14.4 Gc/s	Radionavigation-Satellites (exclusive)
15.25-15.35 Gc/s	Space Research (exclusive)
15.35-15.4 Gc/s	Radio Astronomy (exclusive)
19.3-19.4 Gc/s	Radio Astronomy (exclusive)
31-31.3 Gc/s	Space Research (shared)
31.3-31.5 Gc/s	Radio Astronomy (exclusive)
31.5-31.8 Gc/s	Space Research (shared in Regions 1 and 3, exclusive in Region 2)
31.8-32.3 Gc/s	Space Research (shared)
33-33.4 Gc/s	Radio Astronomy (only in Region 1 and shared)
34.2-35.2 Gc/s	Space Research (shared)

Another Recommendation was addressed to the International Radio Consultative Committee (CCIR) pointing out that " the use of satellite transmissions for direct reception by the general public of sound and television broadcasts may be possible in the future " and urging the CCIR to expedite its studies on the technical feasibility of broadcasting from satellites. Thus, an important step has been taken towards the future possibility of the general public being able to receive radio and television programmes in their own homes direct from satellites.

A further Recommendation called on the forthcoming ITU Aeronautical Conference to provide high frequency channels (bands between 2850-22 000 kc/s) for communications for the routine flight of transport airspace vehicles flying between points of the earth surface both within and beyond the major part of the atmosphere.

Finally, a Recommendation was adopted recognizing " that all Members and Associate Members of the Union have an interest in and right to an equitable and rational use of frequency bands allocated for space communications " and recommending to all ITU Members and Associate Member States " that the utilization and exploitation of the frequency spectrum for space communication be subject to international agreements based on principles of justice and equity permitting the use and sharing of allocated frequency bands in the mutual interest of all nations."

The Conference which has worked throughout in a spirit of harmony and co-operation, can be said to have reached successful agreement on the highly difficult technical problems with which it was faced.

Radio Amateur Convention

During the weekend of 19-20 October, the International Amateur Radio Club (IARC) held a two-day Convention (Hamfest) at the ITU headquarters building. The Club includes among its members telecommunication experts from all parts of the world—many of whom were in Geneva for the Space Radiocommunication Conference—and also several ITU officials.

The Convention sessions were opened at 10.30 a.m. on Saturday by Mr. John H. Gayer, the Club President. The formal opening at 12.15 p.m. began with a recording of the message of U Thant sent *via* satellite to the Space Radiocommunication Conference which text was reproduced in our November issue. Mr. Gerald C. Gross, Secretary-General of the ITU, responded. Certificates of honorary membership were awarded to Mr. Gunnar Pedersen, Chairman of the Space Radiocommunication Conference, Mr. N. D. Psurtsev, Minister of Communications of the USSR, Mr. Joseph H. McConnell and Mr. Ashot Badalov, the Vice-Chairmen of the Conference, Captain C. F. Booth, Head of the United Kingdom Delegation, and Mr. T. A. M. Craven, a former member of the Federal Communications Commission (FCC), who is on the United States Delegation. Each of these distinguished guests responded.

The Chairman's table with, from left to right: Mr. Motin, Captain C.F. Booth, Messrs. Gerald C. Gross, Joseph H. McConnell, Gunnar Pedersen, John H. Gayer, N.D. Psurtsev, A. Badalov, T.A.M. Craven, and N.I. Krasnosselski *(Photo : ITU)*

The day's programme consisted of technical lectures and culminated in a formal banquet at the *Palais des Nations* attended by 114 guests.

Sunday, 20 October, was also occupied by talks and demonstrations and films were shown in the afternoon.

Throughout the Hamfest the Club's station 4U1ITU was available to all guests holding a radio amateur licence. It operated almost continuously during the two days.

The occasion was marked by the first issue of the Club magazine " 4U1ITU Calling," which was distributed free to all delegates to the Conference.

technical co-operation

Departure for Guinea

Mr. André Jeammet of France has been selected for the post of Line Communication expert in the Republic of Guinea and will shortly be leaving Paris to take up his post in Conakry where he is expected to arrive about 20 December.

Mr. Jeammet visited ITU headquarters on 5 and 6 November, 1963, to receive a telecommunications briefing on his mission and to discuss the administrative details connected with his appointment. Mr. Jeammet will attend the Unesco Briefing Centre at the Château du Bois du Rocher, near Paris, before he leaves for Africa.

Visiting headquarters

Mr. Ernest H. Munns, Opex expert in Libya (Programme for the provision of operational, executive and administrative personnel), visited ITU head-

quarters on his way to the United Kingdom on leave. Interesting discussions were held on the state of telecommunications development in Libya, and Mr. Munns was able to give ITU headquarters up-to-date information on the progress of projects previously reported upon by ITU experts Kaiser, Hoffman and van der Woude. The probability that the ITU will shortly be requested to undertake the day-to-day administration of Opex telecommunications appointments made this personal contact with an Opex expert from the field all the more valuable.

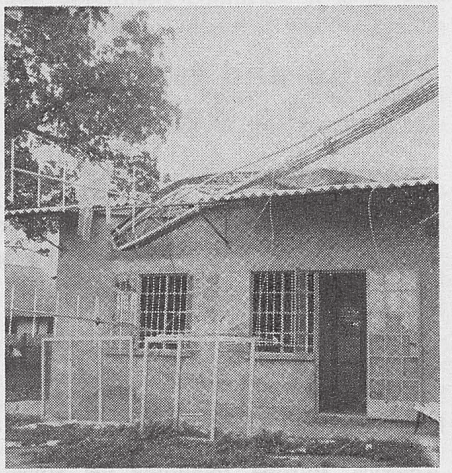
During the Space Communications Conference

During the Extraordinary Administrative Radio Conference on Space Communications, the opportunity was taken to discuss Technical Assistance matters with several national delegates. Among these were Messrs. Bougara and Harbi, of the Democratic and Popular Republic of Algeria, Mr. V. G. Bennett of Kenya, and the Liberian Commissioner of Communications, the Hon. Samuel H. Butler.

Making do with available means...

During his service in Gambia as a training expert in VHF radio telephone systems, Mr. R. T. Lovering was confronted with an unusual situation which had to be dealt with.

In good weather conditions a large tree fell to the ground on the VHF station site at Kuntaur where Mr. Lovering was then based. In its fall, the tree fouled a stay wire of the 60-metre mast carrying the aerials of the VHF trunk network and the whole mast collapsed draping itself across the site and buildings . . . Using two of the recovered aerials and bits of coaxial cable, a circuit to Bathurst was established with the aerials mounted at ground level, as shown in the photograph, and very soon complete traffic facilities were restored using temporary arrangements. It is understood, however, that a new mast, with feeders and aerials, is on its way to restore the system as it was originally planned.



An unusual situation...

administrations and operating companies

Trunk automatic telephony: more than one hundred million calls a month...

In 1961, for the first time, there were more than a thousand million automatic trunk calls in the Federal Republic of Germany. In August, 1962, the monthly figure was a hundred million, but there has been an increase since then. During the first six months of 1963, there was an increase from 108.1 million in January to 114.1 million in June. In the field of trunk automatic telephony, there were 653.7 million calls during the first six months of 1963, representing nine-tenths of all the trunk calls booked. In relation to all trunk telephone calls, the percentage of automatic calls rose, in June, 1963, to 89.5 %, as against 9.8 % in 1950 ! This trend illustrates the successes achieved by the Federal German postal authorities in their indefatigable efforts to introduce fully automatic working in trunk telephony.

During the first six months of 1963, 81.4 million trunk calls were put through by hand, of which nine-tenths (89.5 %, or 73.2 million) were passed by the no-delay method (i.e., with no time-lag after booking). In 1950, this figure was 48 %.

In telephone traffic with persons abroad, there was an increase, in fully automatic calls. For the first six months of 1963, 8 582 000 trunk calls were booked for destinations abroad. 2 436 000 (28.3 %) were put through by the automatic trunk service, as against 27.3 % for the same period in 1962. At present, fully-automatic working is available in many instances—with Austria, Belgium, Denmark, France, Luxemburg, the Netherlands, and Switzerland.—*Presse-Mitteilungen des Bundesministeriums für das Post- und Fernmeldewesen.*

300 000 Norwegian television licenses

The Norwegian Television Service, which opened officially only three years ago, now has registered 242 000 licences and estimates that there will be 300 000 before the end of the year.—British Communications and Electronics.

NBS to publish national radio science journal

The National Bureau of Standards (NBS) has announced important changes soon to be made in Section D of its *Journal of Research*, now published under the title « Radio Propagation.»

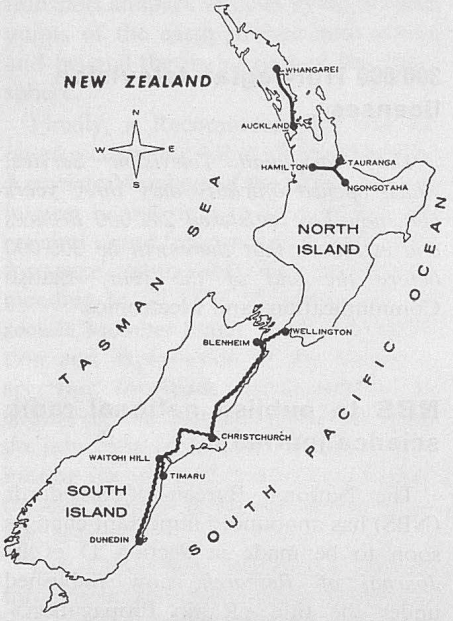
Beginning in January, 1964, Section D will become a national journal of radio science published by NBS in co-operation with the United States National Committee of the International Scientific Radio Union (URSI). In keeping with the broadened scope of the new publication, its title will be changed to *Radio Science* and it will be published monthly rather than six times a year as before.

" Radio Science " will present research papers, as well as occasional survey articles, in radio propagation, communications, and radio science generally. It will serve as the principal publication outlet for the research of the NBS Central Radio Propagation Laboratory and the scientific activities of the United States National Committee of URSI. It will also carry selected papers from the NBS Radio Standards Laboratory and invited papers from recognized authorities in the field of radio science.—*NBS Technical News.*

Microwave radio in New Zealand

The New Zealand Post Office has ordered for telephone communications a 685 kilometres microwave radio system from the General Telephone and Electronics Corporation (GT & E). Production and installation of the system will be completed by the end of 1964.

The New Zealand system will provide communications between Wellington on the southern tip of North Island and major cities along the east coast of South Island such as Christchurch and Dunedin. The route hops across 48 km of water separating the two islands, and skirts a 3000 m mountain range on South Island.



The New Zealand system is indicated by the wavy line on the map. *(Photo: GT&E)*

The system has a capacity of up to 960 telephone channels at one time.—*General Telephone and Electronics.*

Reorganization in the Federation of Rhodesia and Nyasaland

It has been decided to dissolve the Federal Ministry of Posts. Accordingly, Nyasaland (from 1 November, 1963), Southern Rhodesia and Northern Rhodesia (from 1 December, 1963), will assume control of post and telecommunications functions in their respective territories.

Complete Hungarian industrial television equipments

The Hungarian telecommunication industry started the production of complete television equipments for industrial purposes this year. The equipment has a wide field of application in the various branches of industry, transport, hospitals, etc. The equipments will be exported from the next year on by *Elektroimpex* Foreign Trading Company. — *Hungaropress.*

Personnel changes . . .

. . . in Japan

Mr. Kenya Noguchi has been appointed Administrative Director of Telecommunications, Ministry of Posts and Telecommunications, replacing Mr. Iwao Iwamoto.

. . . and in Jordan

Mr. Khalil Samawi has been appointed Director of the Foreign Relations Department at the Ministry of PTT.

international

Radio and television development throughout the world during the last ten years

In its series « Statistical reports and studies », Unesco has issued « Statistics on radio and television 1950-1960 ». This report shows the progress of television throughout the world, but especially in Europe, during this period.

Television

The most spectacular developments have been in television. In 1953, 90% of the world's transmitters lay in North America. Europe, including the Soviet Union, had a mere 7%, while South America and Asia between them possessed no more than 3%. The position is different in 1960: Europe then had 55%, North America 32%, while virgin continents, such as Africa (1%) and Oceania (1%) appear side-by-side with Asia, which goes up to 7%, and South America which has 4%. Similarly with receivers, although North America is still in the forefront, with 89% in 1953 and 60% in 1960. Europe rises from 11% to 31%, Asia (where progress is startling) from a negligible figure to 6%, South America from 0.3% to 2%, while Oceania counts for 1%. Africa, still in its infancy in this field, has a mere 0.1% of the total.

Broadcasting

In broadcasting, there is no great change between 1950 and 1960. In 1960, North America had 50% of all receivers, Europe had 36%, Asia had 8%, South America 4%, Africa and Oceania 1%. But there is a great disparity in the number and power of transmitters, North America, for example, had 46% in 1960, representing 34% of the total power. Europe, with 24%, represented 42% of the total power.

The figures per thousand people throughout the world are as follows: 72 wireless sets in 1950 and 130 in 1960. Television sets: 12 in 1950 and 34 in 1960.—*Unesco.*

Pacific telephone cable link

The United Kingdom's fastest cable laying ship, cable ship *Mercury*, is completing the 72 800 000 dollars trans-Pacific link of the Commonwealth telephone cable.

Cable ship Mercury's assignment was to lay, north and south of Hawaii, 1852 km of cable with forty-two submarine repeaters inserted. The United Kingdom, Canada, New Zealand and Australia will then be linked by the cable, which will be capable of carrying eighty simultaneous telephone conversations, for any of which it will be possible to substitute twenty-two telegraph channels for leased circuits, telex and telegrams. — *Cable and Wireless Limited.*

Fifteen Years Ago...

UNIVERSAL DECLARATION OF HUMAN RIGHTS

On 10 December, 1948, in Paris the United Nations General Assembly adopted and solemnly proclaimed the Universal Declaration of Human Rights.

A fresh stone in the edifice erected by mankind in its campaign against prejudice, hatred and ignorance, this Declaration symbolizes the ideal of freedom, justice, and peace, which ideals the International Telecommunication Union works to bring about.

In this atomic age, in this epoch when outer space is being conquered and science is steadily creating new problems for mankind, it is an excellent thing to be able to invoke the basic principles laid down on 10 December, 1948. Hence this fifteenth anniversary is celebrated with especial fervour by the entire United Nations family, including the ITU, the aim of which, as set forth so majestically in the preamble to the Convention, is to facilitate " relations and co-operation between the peoples by means of efficient telecommunication services."

Space communication and the Mass Media

The United Nations Educational, Scientific and Cultural Organization (Unesco) has issued a report on the above subject. It describes the significance of space communication for the press, for broadcasting, and for television.

The report was drafted by Unesco in consultation with various professional bodies. An attempt is made to define the long-term uses to which space communication may be put. For economic reasons, the report states, it is likely to be applied first of all for the collection and dissemination of news over large areas, and so will redound to the advantage, in the first place, of the press and news agencies.

In wireless, space communication will conduce to better and more reliable reception over vast areas, which will prove very much of a godsend to the new and developing countries. It is in television, however, that they will most make themselves felt.

In education, space communication may help in evolving new teaching procedures.

The first chapter tries to define the features of space communication within the pattern of communication as a whole. The report then deals with technical problems affecting the development and operation of space communication services and with the possible use of space communication to promote the flow of information, the spread of education and cultural exchanges.—*Unesco.*

Adjustment in phase of time signals

An adjustment in the transmission of time signals has been announced jointly by the National Bureau of Standards (NBS), United States Department of Commerce and the United States Naval Observatory. The transmitting clocks at the radio stations were retarded 100 milliseconds 1 November, 1963, at zero hours universal time.

The adjustment became necessary because of changes in speed of rotation of the earth, as determined by astronomical observation. Such adjustments are made by international agreement, according to a plan whereby the times of emission of time signals are synchronized to about 1 millisecond. The last previous adjustment in phase of time signal pulses was 1 August 1961.

The countries participating in the co-ordination of time signal transmissions are Argentina, Australia, Canada, Italy, Japan, the Republic of South Africa, Switzerland, the United Kingdom, and the United States.—*US Department of Commerce.*

technical

Broken cables are « X-rayed »

Károly Király, a technician of the Hungarian Cable Works of Szeged, has designed and developed a new apparatus which enables the fast and accurate determination of failures in insulated conducts and cables. The precise location of defects in conducts or cable-cores often cannot be found with accuracy, because of the insulation. Finding the defect used to involve a cumbersome proceeding with a concomitant high rate of waste.

A new electronic device enables determination of the failure spot to be made within a few moments. While the cable is being wound onto the reel, it passes in front of the sensing element of the device which—like an X-ray apparatus—shows up the breakage in spite of the insulation. Failures are indicated by a blinking light or a buzzer device.—*Hungaropress.*

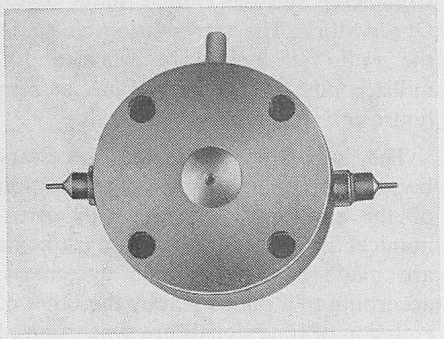
New infra-red detector

The smallest, long-wavelength photoconductive detector available today has been introduced by Raytheon Company.

The QKN1227 is sensitive in the 2-15 micron region of the infra-red spectrum. Its time constant of less than 1 microsecond permits fast scan rates and high resolution.

The modular package has an over-all diameter of 3.02 centimetres and a thickness of 0.99 cm. Its vacuum-sealed and electrically-isolated sensitive element is mercury-activated germanium and the window is barium fluoride. Average detectivity D (500, 900, 1) is* 8.0×10^9 *cm cps* $\frac{1}{2}$ *watt.*

Designed for maintenance-free use in currently available, closed-cycle cooling systems, the new Raytheon infra-red detector operates at 35° K.—Raytheon Company.



New infra-red detector

(Photo: Raytheon)

Star temperatures found low

By using an extremely sensitive infra-red telescope, the detection and mapping of stars with unexpectedly low temperatures have been accomplished.

The discoveries were made by Freeman Hall, a scientist of International Telephone and Telegraph (ITT) Federal Laboratories. Hall described his telescope as so sensitive that the measurements were interrupted by the heat from insects' bodies as they flew past. He also reported interference with his work when heated air currents rose from a cigarette being smoked fifteen metres distant.

Many stars, far too faint to be visible, were found to be extremely bright stars at infra-red wavelengths. It was explained that the comparative lack of visible energy indicates that previous estimates of their temperatures have been too high.

The radiometer used by Hall was described as a reflecting optical system of 50.8-centimetre aperture with an F/2.5 spherical primary mirror and a Newtonian folding mirror directing the radiation to the detector mounted on the side of the tube. Three interchangeable detectors were used. A lead sulphide detector cooled to 195 degrees Kelvin by dry ice was equipped with a fused silica field lens and a gold-plated conical condenser providing an effective speed of F/1. The field of view was $^1/_4$ degree square. The range measured was 1.3 to 3.2 microns.

For the 3-to-4-micron range, a tellurium detector was used with a germanium field lens giving an effective speed of F/1.2. For the 8-to-13-micron region, a liquid helium-cooled, mercury-doped germanium detector was used. The field of view was 0.1 degree square and the aperture was F/2.5.

The scientific interest of this discovery has practical space-age applications. Satellites silent at radio frequencies can be detected by virtue of their heat, which cannot be suppressed. First, it will be necessary to map possible interfering celestial heat sources.—*ITT.*

New element for radio equipment: Temperature autostabilized non-linear dielectric element

Tandel *is a dielectric element with a non-linear dielectric, that is a dielectric the permittivity or dielectric constant of which depends on the temperature or the voltage applied to an element with such a dielectric.*

It is known that a non-linear dielectric attains its best properties only in the vicinity of a certain temperature which, in the case of ferro-electric materials, is referred to as Curie temperature. In the vicinity of this temperature, the voltage non-linearities of the dielectric are most noticeable, and above the Curie temperature the domain structure of the dielectric disappears, the latter being the main cause of the frequency limitations of the respective circuits and of their noise. Till now, it has been assumed that an additional source of heat would be necessary for heating up to the required temperature, and that the achieved temperature would have to be accurately stabilized to make the properties of the dielectric independent of variations of the ambient temperature or other external parameters or conditions. Because of this, existing electronic circuits with non-linear dielectrics have been operated as a rule and preferably sufficiently far away from the Curie temperature to eliminate the necessity of stabilizing this temperature. No proposition has so far been made to usefully employ the effect of the dielectric losses produced on a capacitor with a non-linear dielectric under the effect of a voltage applied from an external circuit. As far as this effect has been taken into account, only the negative side of the problem has been considered, that is the applied voltage has always been kept so low as to prevent dielectric heating which has been considered to affect adversely the properties of the dielectric. However, the invention is based on the fact that it makes inventionally use of the effect of the voltage of an external circuit and the dielectric heating resulting therefrom on the properties of a non-linear dielectric.

It is an object of this invention to achieve with a dielectric operation in the vicinity of the Curie temperature and to stabilize the achieved temperature against temperature variations of the surrounding medium, or the supply voltage and the frequency thereof.

Another object of the invention is to improve by simple means the parameters or electronic circuits based on non-linear properties of the dielectric, that is, for example, to increase amplification in the case of a dielectric amplifier, or the converse gain in a frequency mixer, or the yield of higher harmonics in the case of a frequency multiplier, and to make possible the operation of such circuits even at very high frequencies which could not be achieved with existing dielectric circuits operating below the Curie temperature.

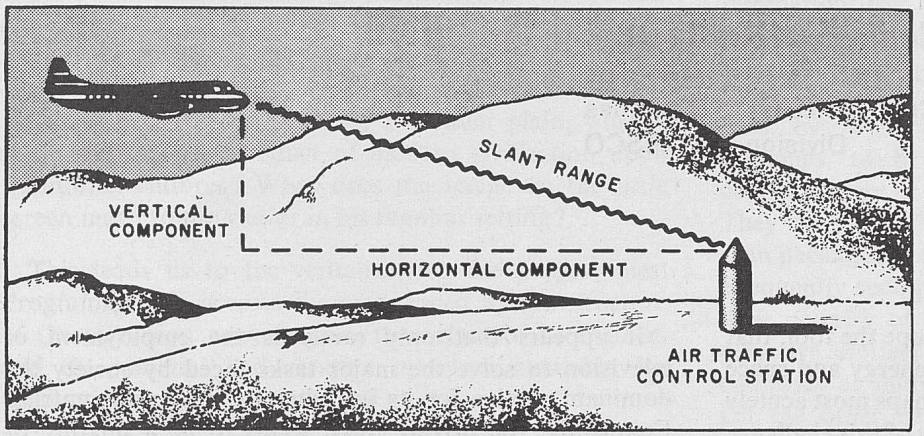
Dielectrics which may be used to achieve the objects of this invention and to realize the same are all the materials with a temperature region in which the dielectric losses are reduced if the temperature is increased. Many materials have already become known which may be used for this purpose, for example triglycine sulphate.

Presented by Antonin Glanc (Czechoslovak Socialist Republic) on the occasion of the International Amateur Radio Convention—Geneva 19-20 October, 1963.

Correcting errors in radar distance measurements

Radio propagation physicists of the National Bureau of Standards (NBS) (United States Department of Commerce) have evaluated the causes of errors in radar distance measurements and derived correction factors for them.

Today's sophisticated radar systems can present digital indications of target distance and are easily calibrated, given the rate of radio propagation to and from the target. However, radar equipments have been improved in accuracy, sensitivity, resolution, and range for years without any accompanying correction for the rate of propagation. The original requirements were met by indications of relative distance, but recent advances in technology have brought a need for absolute accuracy as well.



NBS radio propagation physicists find that errors in radar determination of distance are primarily those determined by the vertical component of the distance *(Design: NBS)*

A radar distance measurement is usually obtained as a slant range, which is composed of horizontal and vertical components. The Bureau's study disclosed that the height error accounts for over 95 per cent of the total error for most radar distance measurements. The correction of height errors therefore will largely correct all radar distance measurement errors. The Bureau undertook to obtain such correction factors, based on normally available meteorological data, for use at the Federal Aviation Agency (FAA) air traffic control stations during a wide variety of climatic conditions.

The investigators first developed a formula for determining net path refractivity. They then verified experimentally that radar height errors were correlated with changes in the computed radio refractive index along the path. The formula permits computing path refractivity as a function of atmospheric pressure, absolute temperature, and water vapour pressure as measured at the radar station. It also incorporates a reappraised value for the effective earth's radius factor.

Next the effects of changes of radio refractive index with height were studied by approximating the average refractive index gradient for different target heights. Mathematical manipulation of the value of g, the assumed gradient along the ray path, enabled the investigators to greatly reduce the height measurement error and standard deviation. They found this step to be effective when the gradient was computed as a function of the radio refractive index measured at the radar station, and more effective when the initial gradient was measured, rather than computed, by refractivity measurements at the surface and at an elevation of one kilometre.

The effect of the radar path angle on range measurement accuracy was investigated for angles from horizontal to nearly vertical by analysis of radio refractive index profiles compiled in previous Bureau studies. These profiles relate refractive index, elevation angle, climatic condition, and season, making it possible to obtain factors for the modification of normal radio refractive index for known conditions of these parameters.

Finally, the variation of index with location and season was combined with the model of the path radio refractive index to obtain radar range corrections for several air traffic control stations. The corrections are for height intervals of up to 21 km for the season and local climate of the station, requiring as data the ray elevation angle and both surface and 1 km altitude refractive indexes. These corrections are effective for ground distances of up to 241 km.

Although the greatest possible correction is obtained by use of the parameters given, excellent corrections are also obtained when the measurement of radio refractive index at 1 km above the surface is omitted. Then the initial gradient, normally determined by index measurements at the surface and 1 km altitude, is replaced by a value determined from past climatological data.—*NBS Technical News.*

Tiros weather satellites have sent back 270 200 television pictures

The Tiros series has established an unsurpassed record of seven successes in seven consecutive launches.

Tiros VII was placed in orbit on 19 June, 1963, complementing Tiros VI in keeping watch during the hurricane and typhoon season. The two satellites have sent back television pictures of hurricanes Arlene and Beulah, and tracked several large typhoons in the Western Pacific.

During the 1961 and 1962 hurricane seasons, Tiros satellites spotted and tracked every major storm in the Northern and Southern hemispheres.

Since the first Tiros went into service, Tiros satellites have sent back a total of 270 200 television pictures of cloud cover, storms, snow and ice conditions, and other weather phenomena. The seven satellites together have logged 1633 days of useful life, and the two most recent—Tiros VI and VII—continue in operation.

An eighth Tiros, carrying a newly developed *Automatic Picture Taking (APT)* system, is scheduled for launch. APT will permit direct readout by relatively simple and inexpensive ground stations anywhere in the inhabited world. —*Radio Corporation of America.*

TELEVISION

in developing countries

Its problems and potential contributions

by

Henry R. CASSIRER
Head of Radio and Television Section
Mass Communication Techniques
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IT IS THE TASK OF THE ENGINEER to shape the tool, that of society to master it. Next to atomic energy and space exploration, this issue faces mankind perhaps most acutely in the field of television. The real intensity of this challenge is apparent particularly in the less developed societies, for it is here that the great constructive potential of television comes into sharpest contrast with the problems poit ses.

The issue is not a theoretical one. Television is firmly established in practically all countries of Latin America, in society dominated by wide contrasts of wealth and poverty, of mass illiteracy and immense educational needs. In Africa, television broadcasting exists in the United Arab Republic, Algeria and Morocco, in Nigeria, Southern Rhodesia and Kenya. Numerous other African States plan its early introduction, among them the Congo (Brazzaville), Ghana, the Ivory Coast, Sierra Leone, the Sudan and Uganda, while at least another handful are seriously contemplating its introduction. In Asia, we find television flourishing in the urban centres of Hongkong, the Philippines and Thaïland as well as planned for early expansion or establishment in India, Indonesia, Malaya, Pakistan and Singapore.

All these societies are dominated by the need to promote social and economic development, to save and invest capital productively, to increase the standard of living of the people, to enhance universal and advanced education, and to combat the scourge of mass illiteracy. Under these conditions, what is the actual and potential role of television?

It appears that only rarely is the employment of television to solve the major tasks faced by society the dominant motive for its introduction in these countries. Frequently, the driving force seems to be a mixture of national prestige, commercial venture, thirst for escape and entertainment, and of the all pervading " spirit of the time " which is hard to resist in any corner of the world.

A country of meager economic and manpower resources which permits the introduction of television, inevitably faces a series of profound problems.

To begin with, we think of course of the cost of investment in studio and transmitting facilities. In actual practice, these appear to be the easiest to meet; offers of capital from private sources or bi-lateral aid frequently are readily available. Television is spectacular and potentially profitable, one or two million dollars do not seem an excessive price to pay for what is considered promising future returns.

The real problems come later. How will receivers be supplied, who will be able to afford buying them? In most cases, receivers have to be imported, a significant drain on foreign exchange. Some countries have been far-sighted enough to couple installation of stations with the mounting of assembly plants for television sets. This reduces the cost of the receiver, provides employment and training for skilled or semi-skilled personel. But the major part of each set will still have to come from abroad, and have to be paid for.

And who can purchase the set? Is television to be restricted to the higher income groups? Is it to become a

heavy burden upon the meager family budget? Will sets be available for community reception and educational institutions, and how are these to be paid for? It has been found that the appeal of television is so powerful that all advance estimates on the sale of receivers are generally exceeded in practice. But there are serious limits, not only to purchasing power of the individual family and the viewing group, or to the foreign exchange available for imports, but to the range of television itself. Its signal is bounded by the horizon; without further relay installations, transmission is confined to urban areas. In societies where the bulk of the people live on the land and where the greatest economic and educational needs are to be found in rural areas, television becomes an attribute of urban civilization, further enhancing its removal from the hinterland. While radio has overcome this limitation, thanks to the transistor set, television is still largely tied to the electric mains.

To introduce a tool of high technology into a society deprived of modern skills is bound to lead to further complications. The station personnel requires to be trained to assure smooth, continuous production within the country. Receivers sold must be installed and constant maintenance provided. And on a broader plain, what is the impact of this product of modern civilization upon traditional cultures? What does the image on the little screen mean to the viewer in his familiar setting?

This leads us to the veritable test, the programmes. Programming is necessarily conditioned by the structure of the television organization, the origin of its finance, and the material and creative resources available for production.

As so often he who pays the piper calls the tune. Four sources of finance normally are open to television organizations: licence fees paid by the viewer, government grants, private donations and revenue from commercial advertising. The structure of broadcasting systems may range from government departments, through public corporations to private commercial enterprises. In practice, we can observe any number of combinations between these alternatives. Broadcasting may be conducted by governments but be financed exclusively commercially. Or it may be in private hands, but derive part of its funds from government grants applied to educational programmes. Stations may be entirely non-commercial, receiving their income from licence fees, but yet preserve a relative independence from government by virtue of the fact that they are constituted as public corporations.

What matters above all is the source of revenue. If income is derived exclusively from advertising, the broadcaster will inevitably seek to obtain a maximum audience at the lowest cost per programme; serious limitations will be imposed upon public service. Moreover, effective advertising on television will considerably enhance the demand for consumer goods, a matter which is likely to have serious impact upon the economic planning as a whole. If revenue comes exclusively from government sources, the station's policy will be dependent upon government policy, and it may be difficult to obtain the necessary funds to assure quality programming and an expanding operation. If licence fees are to be relied upon, an efficient machinery will be required for their collection and great obstacles are likely to be faced during the initial phase to obtain the necessary funds. Frequently, the solution may lie in a combination of all these systems. For instance, a public corporation may derive its essential finance from licence fees, but engage in limited commercial broadcasting and seek government funds to defray the expense of programmes which are of direct value to government departments, such as ministries of education or agriculture. This involves a delicate policy of programme planning, with a constant temptation to allocate the peak viewing hours to commercial programmes in an effort to augment limited resources. Inevitably this will reduce public service features and the ability of the station to meet minority needs. Educational programmes, language courses, literacy classes or programmes serving community interests, which normally should be carried in hours after work so that the adult population may benefit from them, may find themselves relegated to far less favourable viewing hours.

This tendency is further enhanced in developing countries by two contradictory trends. Educational programmes, to be suited to national audiences should consist largely of elements produced in the country itself. They are likely therefore to be relatively more expensive than packaged programmes on film obtained from abroad. Frequently such packages have already been amortized in their country of origin (e.g. so called " Westerns " and detective stories) so that they can be offered to other countries at minimum cost while still making a profit. On the other hand there exists a tendency by station managers trained in the approach to commercial television programming prevalent in highly developed societies, to consider educational programmes as necessarily of only small commercial interest. In actual fact, however, it is likely that educational programmes truly suited to the needs and aspirations of the people in developing societies have far greater audience appeal than is normally assumed.

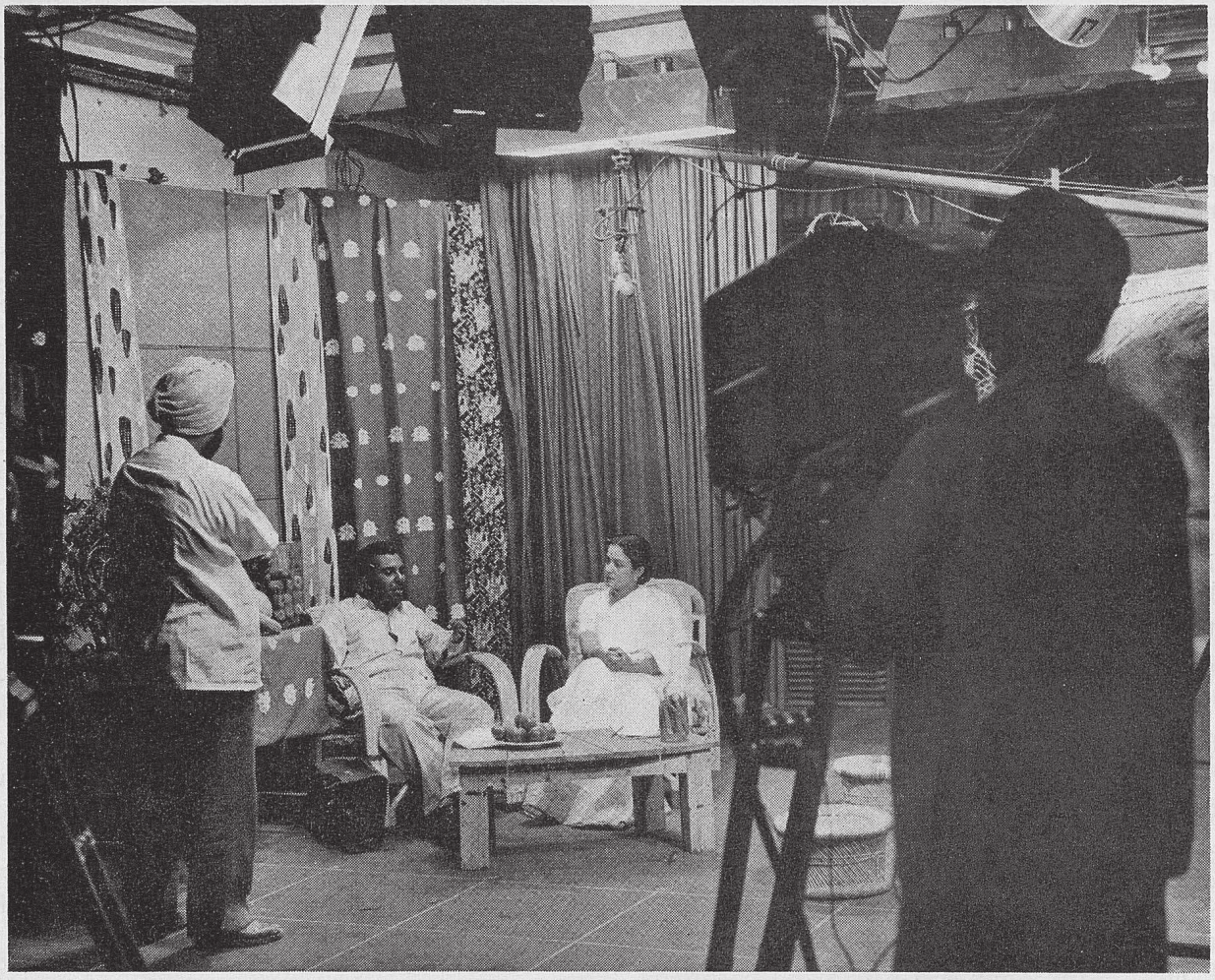
Such audience appeal depends, however, largely upon the quality of production. Here we meet another problem: the lack of trained creative staff and adequate technical resources to assure imaginative production. Staff training, ample rehearsal time, facilities for integrating film, art work and dramatic sequences into programmes are essential prerequisites for the constructive use of television.

This need highlights in turn a further conflict of tendencies: if income is derived from government grants, licence fees or donations and thus relatively limited and stable, station directors will seek to restrict the total number of programme hours per week, in order to apply the maximum of resources to a minimum of programmes. If on the other hand, income is primarily dependent upon advertising, station directors have a tendency to extend programming as much as possible in order to multiply opportunities for the insertion of commercial messages. This leads necessarily to a lengthening of the broadcast day and a thinning out of resources for individual pro-

grammes. On the other hand, it may also be argued that commercial revenue is likely to bring in relatively so much greater funds that the overall resources for programming, including the development of technical facilities and staff, are far greater than could be expected from revenues derived from meager governmental budgets. Income from licence fees may present a compromise solution, for their yield is not static, it will expand as the audience expands, providing of course that the audience can afford to purchase receivers and pay the fees. Yet if reception is based largely on community viewing, the ratio of viewer to fee-paying receiver is likely to be so low that even a massive impact of television upon the national audience will still lead to only a relatively small income from fees.

These are some of the practical, material problems of introducing television into a developing society, problems which are closely related to television's cultural and psychological implications. Is television above all a means to escape from reality, to have easy access to entertainment and relaxation, or is its primary function to convey information and education? In the countries where television began its march across the world, it gained its impetus from the inventions of scientists, and found expression and character mainly in popular entertainment. Information followed as a secondary important function, while education or even the wider concept of enlightenment is only a poor, though growing third. To meet the needs of a developing society, the order should frankly be reversed. But is this possible in the light of the above problems?

It will be necessary to recognize that television's principal role should be to give expression to the needs, to the character and the aspirations of the society in which it is functioning. As the society changes, so should television change. The introduction of programmes produced in other cultures ought to be subject to this criterium. Thus conceived, television may cast into the mould of mass communication traditional forms of cultural expression—music and dance, story telling and drama, visual arts and folk crafts. Products of a pre-literate society, these cultural forms call for an audio-visual rather than a printed mode of communication. Illogical as television appears at first sight for developing societies from an economic or technological point of view, the insistent search for it may in fact respond to a deep-seated and fully justified desire to adapt a traditional culture to the modern age. While the problems of television are great, its opportunities are also immense.

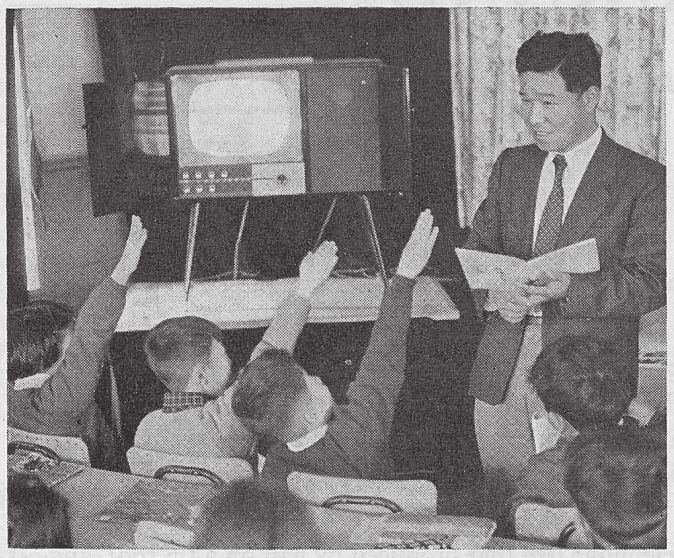


New Delhi, India. A programme aimed at market gardeners in the region is in preparation. An agronomist gives his advice on the cultivation of vegetables *(Photo: Unesco/P. Almasy, 1960)*

Not only does television appeal to the illiterate more powerfully than any other medium of communication, including radio, but it may also effectively serve to teach literacy itself. It is the only mass medium which can serve this purpose, provided it is coupled with the production of teaching and reading materials which cater to the interests and vocabulary of the new literate.

Television is adapted to this task not only because it is a " complete " audio-visual medium but because it is particularly suited to group reception. Such groups are a new force in the community, not just a class of pupils, but an assembly of adults who deepen their viewing experience through follow-up discussion, practice and action. The teleclub, a relatively unusual feature in an affluent society can become the basis of mass reception in the poorer countries. It is more than the spontaneous gathering of a group of eager viewers around a television receiver. It requires conscious organization, leadership and guidance to be effective as a tool of education and social development. The role of television depends upon the manner of its utilization as much as upon the nature of its programmes.

Here is a new approach. Not just casual looking in but conscious group viewing and utilization. Not just haphazard programming but deliberate planning so that the form and content of television respond intimately to the needs of society. As a cornerstone in all efforts to shape the minds of men and to prepare the individual for the difficult tasks facing him and his society, television takes on an entirely novel character. Many of the problems to which it gives rise in a poor, underdeveloped society, problems which were stressed in earlier passages of this article, fall into place and are overcome because television is seen not as a toy of prestige and commercialism but as a vital force of education and cultural enrichment.



Watching television at the Inamuragasaki primary school, near Kamakura, Japan *(Photo: Unesco/P. Almasy, 1960)*

Educational television means of course first of all service to education in its most formal sense. Outstanding teachers instruct classes in subjects where qualified specialists are lacking, so that children may learn under the combined guidance of the subject specialist on the screen and the classroom teacher standing next to it. In areas where there are no schools at all, television may become the very core of instruction. In all educational institutions new subject matter is introduced, new approaches to established subjects such as history and geography are presented within the shortest span of time. Teachers in service receive training to improve their skill and knowledge. In short, television is used to cope with the pressing lack of teachers, schools and teaching materials, and to adapt the content of education to the changes of society.

Education by television means also instruction of adults. In literacy teaching it may yet find one of its most fruitful fields of application, if current experiences, in more highly developed societies are any indication. Instruction can also be given in such fields as vocational training or agricultural production. In all cases, it is of course essential that the message on the screen is matched by directed group discussion and individual practice on the receiving end.

Television has proven itself also in the vast field of less formal adult education. Civic issues, health education, the manifold tasks of community development, they all can be transposed vividly to the television screen, and stir the viewer in his mind and action.

One of the essential tasks of a society in transition is to link the individual in his traditional setting with fellow men in other regions of the nation, and beyond it with the closely knit net of world society. Here is a role for television in its many facets: the documentary and the foreign films, the interview and the visit to places of work and livelihood, the competitive game and the performances of national artists, music and dance, they all contribute to bring about greater awareness, understanding and familiarity with others from afar.

Such a link is vital for a new nation which seeks to find its unity and personality despite great differences of language, custom and tradition. The ability of government to address itself directly to the people, unhampered by any barriers of illiteracy and communicating through the emotional impact of personality and gesture, unquestionably contributes to creating that climate which alone makes possible a common effort towards improvement of social and economic conditions, towards universal literacy and education.

Educational television therefore covers the entire gamut from direct instruction to cultural expression and communication. It needs to be neither boring nor dull, and can have audience appeal from a broad public. What counts is the essential point of view from which it is produced, the principle that all its output should serve educational and constructive purposes, it being under-

stood that relaxation and recreation can be as important to learning as the lesson itself.

But how can television play this role in the developing countries in the face of the numerous obstacles, the technological problems, the high cost of receivers and programmes, the lack of trained staff? None of these obstacles are insuperable as such, though they require allocation of considerable funds and qualified personnel. the training of staff and an intensive search for new equipment, new forms of organization and new types of programmes suited to the needs television is called upon to meet.

It will be possible to find these funds, to liberate skilled personnel, to train new cadres and to organize the constructive use of television, if its importance is fully appreciated and recognized. If television is seen as a source of relative luxury, if its role in education is supplementary and incidental, if governments believe that commercial television will bring them " something for nothing," its cost in a developing society will always be prohibitive. But if it is placed in a position where it can make a major contribution to social, economic and educational development, it may turn out to be among the cheapest, the most effective and the fastest means to obtain rapid advances.

This does not imply preference for any one particular structure and method of finance, a matter for national decision, which may frequently imply a mixture of the various systems indicated above. What counts above all is that the essential purpose of television as a vital constructive tool is safeguarded, and that the necessary resources of finance and personnel are made available through whatever method appears most effective and suited to conditions.

The urgent desire of emerging nations is to *brûler les étapes*, as the French-speaking countries of Africa put it, to pass rapidly over intermediary stages into the second half of the twentieth century. In doing so, they are reaching out for every resource available to modern man, and not least for television.

(Original language : English)

THE JOURNAL

fifty years ago

A new way of producing electrical oscillations for radiotelephony

. . . . .

An American physicist, E. Leon Chaffee (Jefferson Physics Laboratory, Harvard University) has recently devised a way of producing oscillations: . . . rectified pulses with a period roughly double that of the secondary oscillations are introduced into the primary circuit; the secondary oscillations are of the sine-wave type, and are of constant amplitude if the primary pulses are sufficiently frequent. The frequency of the primary pulses can be modified at will, but is generally several hundred thousand per second, and may be as much as a million or more. The system can be adjusted so that the primary pulses are renewed at intervals of three, four, etc., secondary pulses. The secondary circuit restitutes no energy to the primary one. It oscillates with its own, single period. The oscillations have the continuity of those supplied by the singing arc, but are more constant and more advantageous in form.

News

Telephony and weather forecasts. — Telephony may be used to ascertain atmospheric variations. This is how:

In a good conducting earth, two cast-iron rods are planted, 6 or 7 metres apart. Every week or fortnight the base of the rods is watered with a solution of ammonia chloride. Each of the two rods is linked by copper wire to the poles of a telephone.

When a tempest approaches, there is a noise in the telephone like that produced by hail on a tin roof, and the noise gets steadily stronger as the storm approaches. Lightning produces a dull noise. With a little practice, the noise perceived can be used to tell how far off a storm happens to be. Hurricanes have been detected between three and ten hours before their arrival at the point of observation.

(L'Elettricista)

JOURNAL TÉLÉGRAPHIQUE - December, 1913

by

Dr. R. L. SMITH-ROSE

President 1960-1963

GOLDEN JUBILEE OF URSI

XIVth General Assembly in Tokyo

THE INTERNATIONAL SCIENTIFIC RADIO UNION, known as URSI, held its XIVth General Assembly from 9 to 20 September, 1963; and this was attended by nearly five hundred representatives from twenty-six countries, with an additional four hundred or so observers from Japan. The scientific programme of the Assembly was organized under seven commissions, while special committees dealt with the problems of space research, the influence of the ionosphere and troposphere on the propagation of radio waves, and with preparations for a world-wide observational programme during the International Years of the Quiet Sun (IQSY), starting in January, 1964, and extending to December, 1965.

Historical

This General Assembly was noteworthy in that it was held during the fiftieth anniversary of the formation of URSI at a small preliminary meeting in Brussels attended by nine scientists in October, 1913. A second meeting was held in April, 1914, when fourteen scientists from six European countries were present.

After the world war of 1914-1918, URSI was one of the first of the scientific unions that were organized in 1919 under the general supervision of the International Research Council, which in 1931 was replaced by the International Council of Scientific Unions (ICSU). The other three unions in existence at that time were the International Astronomical Union (IAU), the International Union of Geodesy and Geophysics (IUGG), and the International Union of Pure and Applied Physics (IUPAP).

The first General Assembly of URSI was held in Brussels in July, 1922, and was followed by others in Washington (1927), Brussels (1928), Copenhagen (1931), London (1934) and Venice (1938). After an interval during the second world war, the activities of URSI were resumed at the VIIth General Assembly held in Paris in 1946; and this was followed at two-year intervals by meetings in Stockholm, Zurich, Sydney and The Hague until 1954. On the last occasion, it was decided to change the interval between assemblies to three years; and the XIIth and XIIIth were held respectively in Boulder, United States of America in 1957, and London in 1960.

The International Scientific Radio Union is one of the fifteen scientific bodies which now adhere to ICSU; and it is in effect a federation of the relevant committees on scientific radio of the national academies in twenty-eight countries throughout the world. The objectives of URSI are to promote and organize radio research requiring international co-operation, to encourage the development of such agreed methods of measurements as may be required for the study of any radio phenomena, with particular reference to those associated with the Earth, its atmosphere and outer space. The influence of the Sun and of general and geophysical conditions on the radio phenomena has naturally required close collaboration between the four unions mentioned above. In more recent years, this collaboration has been extended to include the international Committee on Space Research—Cospar—which was formed in 1958, and has held its sixth Plenary

Meeting and the fourth International Space Science Symposium, in Warsaw (June, 1963).

During the present General Assembly, it was announced that the history of URSI including that of its commissions and associated bodies had now been published as a Jubilee volume; and copies could be purchased on application to Colonel E. Herbays, Secretary General, URSI, 7 Place Emile Danco, Brussels 18.

The URSI Assembly in Tokyo

In Tokyo, the General Assembly of URSI was held in the Takanawa Prince Hotel, where the accommodation was ample for the plenary meetings, attended by some eight hundred persons, and for the meetings of the various commissions held concurrently in rooms suitable for attendances of from fifty to two hundred persons. Office accommodation was also provided for the President and the Secretary General and his staff; while, in addition, a proportion of the visitors were able to live in the hotel, which is situated in attractive grounds with two swimming pools and separate " garden " restaurants.

Following the arrangements made in London in 1960, the Tokyo General Assembly was organized under the then existing seven commissions, the titles and chairmen of which were:

Commissions	*Chairmen*
I Radio Standards and Measurements Methods	Dr. W. Adelsberger (Federal Republic of Germany)
II Radio and Troposphere	Mr. J. Voge (France)
III Ionospheric Radio	Mr. J. A. Ratcliffe (United Kingdom)
IV Radio Noise of Terrestrial Origin	Prof. R. A. Helliwell (United States of America)
V Radio Astronomy	Prof. Sir Bernard Lovell (United Kingdom)
(In Sir Bernard Lovell's absence, Commission V was presided over by Dr. J. Hagen (United States of America))	
VI Radio Waves and Circuits	Mr. J. Loeb (France)
VII Radioelectronics	Prof. W. G. Shepherd (United States of America)

Past experience has indicated that the range of scientific activities in various parts of the world in most, if not all, of the above fields is so great that it has become necessary to restrict the scope of the items selected for discussion at the sessions available to the above commissions. Accordingly each commission chairman had formulated in advance the subjects to be discussed, and had invited one or more well-known authorities to prepare introductory papers for presentation at Tokyo.

Commission I

To a large extent, the activities of Commission I are fundamental to the several and various types of measurements involved in the field of work of other commissions. This first Commission held five sessions at which a review was made of the present position of frequency standards, including quartz clocks and automatic measuring systems, standards of power measurement, the transmission of standard frequency signals, and general measurements at microwave frequencies. The morning session on atomic and molecular frequency standards was held jointly with Commission VII in view of its general interest in radioelectronics.

Commission II

The sessions of Commission II were devoted to a discussion of recent advances in our knowledge of the propagation of radio waves through the lower atmosphere, including the influence of irregularities of terrain and of vegetation on such propagation. Important subjects considered included radio climatology, radar meteorology and cloud physics, and the formulation of models of the troposphere designed to explain or describe the phenomena experienced in this field of propagation. An interesting session was held jointly with the Space Radio Research Committee of URSI to review the manner in which the propagation of radio waves through the troposphere affects communications with vehicles in space.

Commission III

From the earliest days of URSI, the activities of this commission have always had a major interest, and our present knowledge of the ionized regions of the atmosphere is largely due to the results of sounding by radio waves. At Tokyo, Commission III reviewed the present state of knowledge of the Sun's ionizing radiation and the constitution of the atmosphere. Separate sessions were also devoted to geomagnetism and the ionosphere, to ionospheric storms, and to the distribution of electrons throughout the ionosphere. An important session, held ointly with Commissions IV and V, discussed in some detail the programme of international observations on radio and the ionosphere to be conducted during the forthcoming IQSY (International Quiet Sun Year).

Commission IV

In collaboration with the Committee on International Co-operation in Geophysics (CIG), the fourth Commission held sessions devoted to a review of the results on atmospheric noise obtained during the International Geophysical Year (IGY) and of the programme for the forthcoming IQSY. Another session was concerned with the corresponding programme of observations on " whistlers" during the same International Years. The noise phenomena associated with very low and extra low frequencies were also considered; and, at joint sessions with Commissions II and III, a discussion took place on guided waves in the troposphere and ionosphere.

Commission V

Commission V carried out a comprehensive review of the whole field of radio and astronomy, including the holding of a joint session with Commissions VI and VII and the Space Radio Research Committee on observational techniques and measurements. A similar collaboration with the interested commissions was achieved at the

session on radio astronomy of the solar system. In addition to these, four sessions were devoted to radio astronomy of the Galaxy, of discrete sources, and of the active and quiet Sun. Most of these sessions were of mutual interest with the commissions dealing with the ionosphere, with radio noise and with space research. There was also some discussion of the bands of frequencies desirable for radio astronomy, and including the need for better protection of the frequencies at present in use. This matter was considered to be of great importance in view of the Extraordinary Administrative Radio Conference on Space Communications of the ITU, which met in Geneva in October, 1963.

infra-red and optical radiation in addition to radio in the millimetre wave region.

Inter-Union Committees on the Ionosphere and Radio Meteorology

Prior to the General Assembly, the Inter-Union Committee on the Ionosphere held a three-day meeting in Tokyo to discuss certain problems of mutual interest to URSI, the International Astronomical Union (IAU), and the International Union of Geodesy and Geophysics (IUGG). A corresponding meeting of the Inter-Union Committee on Radio-Meteorology (URSI/IUGG), was held in Berkeley, California, during the General Assembly

The Chairman's table at the opening meeting, with Mr. E. Herbays, Secretary-General, delivering the report.

Commission VI

The sessions of Commission VI discussed electromagnetic theory, with particular reference to diffraction problems and to transmission through inhomogeneous and anisotropic media. Papers were also presented on information theory and the related statistics of communication through variable channels. Most of the meetings were of interest to participants in the work of Commissions II and III.

Commission VII

The meetings of this commission were generally of great interest to members of other commissions, for they dealt with such topical matters as the physics and applications of Lasers and Masers; and with Plasmas on both laboratory and geophysical and astrophysical scales.

Space Radio Research Committee of URSI

One of the sessions of Commission VII was devoted to the subject of " Satellite Communication Devices." This was naturally of great interest to the URSI Space Radio Research Committee, which also held a general session on " Space Communication Systems " and the conduct of both Ionospheric and Planetary research by means of Satellites and Space Probes, using where advantageous

of the IUGG, and two weeks before the Assembly of URSI in Tokyo. Both meetings were successful in bringing together the scientists working in these respective closely related fields.

International Ursigram and World Days Service

The international co-ordination of many geophysical observations and the immediate telegraphic interchange of reports of outstanding solar and geophysical phenomena is arranged through the International Ursigram and World Days Service (IUWDS). Advantage was taken of their presence in Tokyo to have a meeting of the available members of the IUWDS Steering Committee to co-ordinate the activities of the four regions—Europe, Eurasia, Western Hemisphere and Pacific—into which the world is divided for the purpose of this service. Closely associated with this work is that of the CIG/IQSY working group, which is making detailed preparations for the programme of observations which, as already mentioned, will begin in 1964.

Memorial lecture on Professor Dr. Balth. van der Pol

As a tribute to the memory of the late Professor Balth. van der Pol, who was very actively associated with the work of URSI, both before and after he became Director of the International Radio Consultative Committee

(CCIR), a short lecture was given by Professor Ch. Manneback, Treasurer of URSI. This lecture presented in outline a review of Dr. van der Pol's interest in radio-electronics and in some of the phenomena associated with the propagation of radio waves. The review was of great interest in demonstrating the special qualities and abilities of Professor van der Pol in conducting mathematical research of great theoretical interest while at the same time showing how the results could be applied directly to the problems of practical communications.

The van der Pol Memorial Medal

The General Assembly acknowledged very warmly the generosity of Mrs. van der Pol in donating the funds for URSI to establish a gold medal in memory of her late husband. The medal is to be awarded at each General Assembly to the scientist who, in the opinion of the Board of Officers of URSI, has made the most important contribution in the field of scientific radio during the preceding three years.

On this occasion—the XIVth General Assembly—the medal was awarded to Professor Martin Ryle of the Mullard Radio Astronomy Observatory at the University of Cambridge, England, Fellow of the Royal Society. On receiving the medal from the hands of Mrs. van der Pol, who congratulated him on his outstanding scientific research, Professor Ryle gave a short lecture on some of his most recent work concerned with the development of radio astronomical telescopes of large aperture.

Greatly to the surprise of the recipient, Mrs. van der Pol presented a second Gold Medal to Colonel Eng. E. Herbays, who has been associated with the work of URSI since 1928, and has been Secretary-General for the past thirty years or so. The General Assembly greatly applauded this generous recognition of the loyal and devoted service which Colonel Herbays has always given to the affairs of URSI.

Closing Plenary Session

The closing session of the XIVth General Assembly was held on Friday, 20 September, 1963. At this meeting reports were presented by the chairmen of the commissions and of the committees dealing with finance and publications. The various recommendations and resolutions of the Executive Committee were also presented and formally adopted by the Assembly.

The President announced that the Executive Committee had decided to recommend that Professor I. Koga of Japan should be elected to succeed him as President for the following term of three years; the Assembly accepted this with acclamation. It was further recommended that M. B. Decaux and Professor A. Prokhorov should be re-elected as Vice-Presidents; and that Dr. W. Dieminger and Professor S. Silver should be elected to fill the two vacancies in the list of vice-presidents.

On completion of his normal term of office as immediate Past President, Dr. L. V. Berkner was elected an Honorary President of the Union, and Dr. R. L. Smith-Rose was appointed to the position of Past President.

At the closing session also, the title of Commission IV was changed to that of " Radio and the Magnetosphere," and a permanent sub-commission was established under it to deal with " Radio Noise of Terrestrial Origin."

The following chairmen of commissions were then elected for the ensuing three-year period 1963-1966:

I	Dr. L. Essen	United Kingdom
II	Mr. J. Voge	France
III	Mr. J. A. Ratcliffe	United Kingdom
IV	Prof. H. Booker	United States of America
	IV Sub-commission	
	Prof. A. Kimpara	Japan
V	Prof. H. N. Christiansen	Australia
VI	Dr. F. L. Stumpers	Netherlands
VII	Prof. P. A. Grivet	France

On behalf of all the associated unions and related scientific bodies, which had been invited by URSI to participate in this General Assembly, Dr. L. V. Berkner, Past President, and the representative of ICSU, expressed his gratitude for having the opportunity of participating in this very successful General Assembly.

Mrs. R. L. Smith-Rose spoke on behalf of all the visiting ladies in Tokyo, and expressed their great appreciation and gratitude to the members of the Japanese Ladies' Committee for their hospitality and the opportunity provided to see many of the interesting features in and around Tokyo and to participate in some of the ceremonies associated with life in Japan.

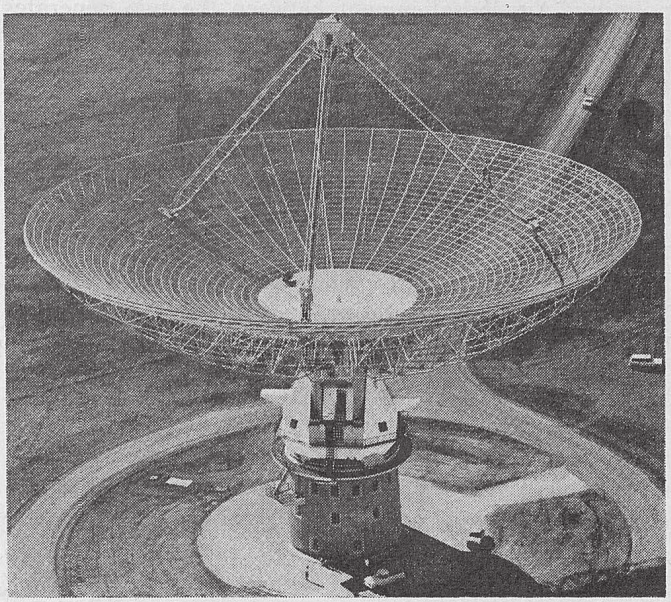
Professor I. Koga, as the newly-elected President, then expressed his gratitude and appreciation of the honour conferred upon him; and he hoped that his work on behalf of URSI would enable him to justify his position. He felt that his remoteness from the office of the Secretary-General might lead to some difficulties, but he was relieved to know that the immediate Past President would be available to act for him should it prove necessary.

Finally, Dr. Smith-Rose brought the proceedings to a close, by expressing his appreciation of the services of all those who had contributed to making this General Assembly such a great success, including in particular the energetic activities of the Secretary-General, Colonel E. Herbays, and of his most able assistant, Mlle Y. Bogitch. But not only the members and officers of URSI were involved; the Chairman, Secretary and all the members of the Japanese National Committee were congratulated on the successful planning and organization of the Assembly in all its details. These included the arrangement of a series of technical and other visits which were enjoyed by all participants including the ladies.

It was then announced that the next General Assembly will be held in September, 1966, in Munich, at the invitation of the German National Committee, and this will be preceded by a special symposium on radio wave propagation in Belgrade at the invitation of the Yugoslav National Committee.

The President closed the proceedings by inviting the Assembly to join with him in expressing his deep and heartfelt gratitude to everybody in Japan, and in Tokyo in particular, who had contributed in any way, scientifically, technically and socially, to the success of the XIVth General Assembly of URSI.

(Original language : English)



THE PARKES 64-METRE RADIO TELESCOPE

by

Harry C. MINNETT

RADIOPHYSICS LABORATORY, SYDNEY

THE 64-METRE RADIO TELESCOPE is the principal instrument of the Australian National Radio Astronomy Observatory at Parkes in New South Wales. The Observatory is owned and operated by the Division of Radiophysics of the Commonwealth Scientific and Industrial Research Organization (CSIRO).

The initiation and success of the project are due primarily to Dr. E. G. Bowen, Chief of the Laboratory. Funds were obtained partly from the Carnegie Corporation, the Rockefeller Foundation and other private donors, and the balance was provided by the Australian Commonwealth Government. Before construction commenced extensive feasibility studies were carried out by Freeman, Fox and Partners of London to evolve a design satisfying the requirements formulated by the Radiophysics Laboratory. The telescope was built by MAN *(Maschinenfabrik Augsburg und Nürnberg)* of the Federal Republic of Germany who were responsible for the work of all sub-contractors.

The site was selected after an extensive search for a region of very low electrical noise level to avoid interference with the very weak radiation from celestial sources. As a result of this low-noise requirement, it was decided to locate the instrument on the western side of the coastal mountain ranges to protect it from interference generated in the city of Sydney and the industrial regions to the north and south. The final choice was a shallow valley about 320 kilometres west of Sydney and about 25 kilometres from the town of Parkes, from which it is effectively shielded by a series of ridges.

The Observatory is situated on 160 hectares of flat land to provide adequate space for a network of rail tracks on which a mobile 18-metre radio telescope will be operated as a variable-orientation variable-spacing interferometer. Other facilities comprise emergency generating plant, a workshop, houses for resident staff and an observer's lodge to accommodate staff from the Radiophysics Laboratory in Sydney during their observing periods.

Features of the telescope

The principal features of the design are shown in Figure 1. The parabolic reflector or dish, 64 metres in diameter, has a focal length of 26 metres. It is surfaced with wire-mesh panels which provide highly efficient operation down to wavelengths of 10 centimetres and below. The faint radio signals from space are focused by the dish onto a small receiving aerial such as a dipole array or horn, which can be remotely rotated for polarization measurements and is easily changed for operation at different wavelengths. A small cabin, supported by a tripod structure just above the focal plane, houses the initial stages of the radio receiving equipment. After amplification by low-noise amplifiers, the signals are converted to an intermediate frequency and transmitted

by low-loss coaxial cable to the main receiving equipment on the middle floor of the concrete base tower.

On top of this tower is the altitude-azimuth mounting which allows the dish to be tilted 60° from the zenith and to be turned to any azimuth. The mounting consists of a massive steel turret carried on four rollers running on a circular track. Two of the rollers are driven through gear boxes by electric servomotors.

Two altitude bearings at the top of the turret support a cylindrical hub from which the ribs of the dish structure are cantilevered. Extending below the hub are two counterweight structures which balance the weight of the dish. Racks attached to the bottoms of the counterweights are driven through pinions and gear boxes by the altitude servomotors.

A novel method is used to guide the dish in equatorial co-ordinates when tracking celestial bodies. Concentric with the base tower is a long column, carefully isolated from the rest of the structure. The top of this column supports a small equatorial type mounting similar to that used by optical astronomers. Instead of a telescope, however, the mounting carries a flat mirror which may be pointed in any desired direction from a control desk on the top floor of the base tower.

An optical auto-collimating device attached to the hub of the dish continuously compares the direction of the dish axis with the direction in which the mirror is pointing. Any misalignment between the two generates electrical signals which are fed back to the driving motors of the dish to correct the error. In this way the dish is automatically forced, as a " slave," to follow precisely the movements of the equatorial " master."

The performance of the telescope has exceeded the design specifications in all respects. Direct survey and radio measurements indicate that the dish is parabolic to better than 5 mm RMS when pointing to the zenith. When tilted, no deterioration due to dish distortion can be detected at the shortest operating wavelength of 10 cm.

Over-all pointing errors from all causes, including the effects of atmospheric refraction, are less than 1.5 minutes of arc. When corrected for known errors, position measurements have an accuracy of better than 0.3 minutes for declinations north of −40°, with somewhat lower accuracy near the south celestial pole, due mainly to lack of calibration sources of accurately known position.

A number of receivers developed by the Radiophysics Laboratory are available for use at wavelengths of 11, 21, 30, 75 and 220 cm. All receivers are of the switched

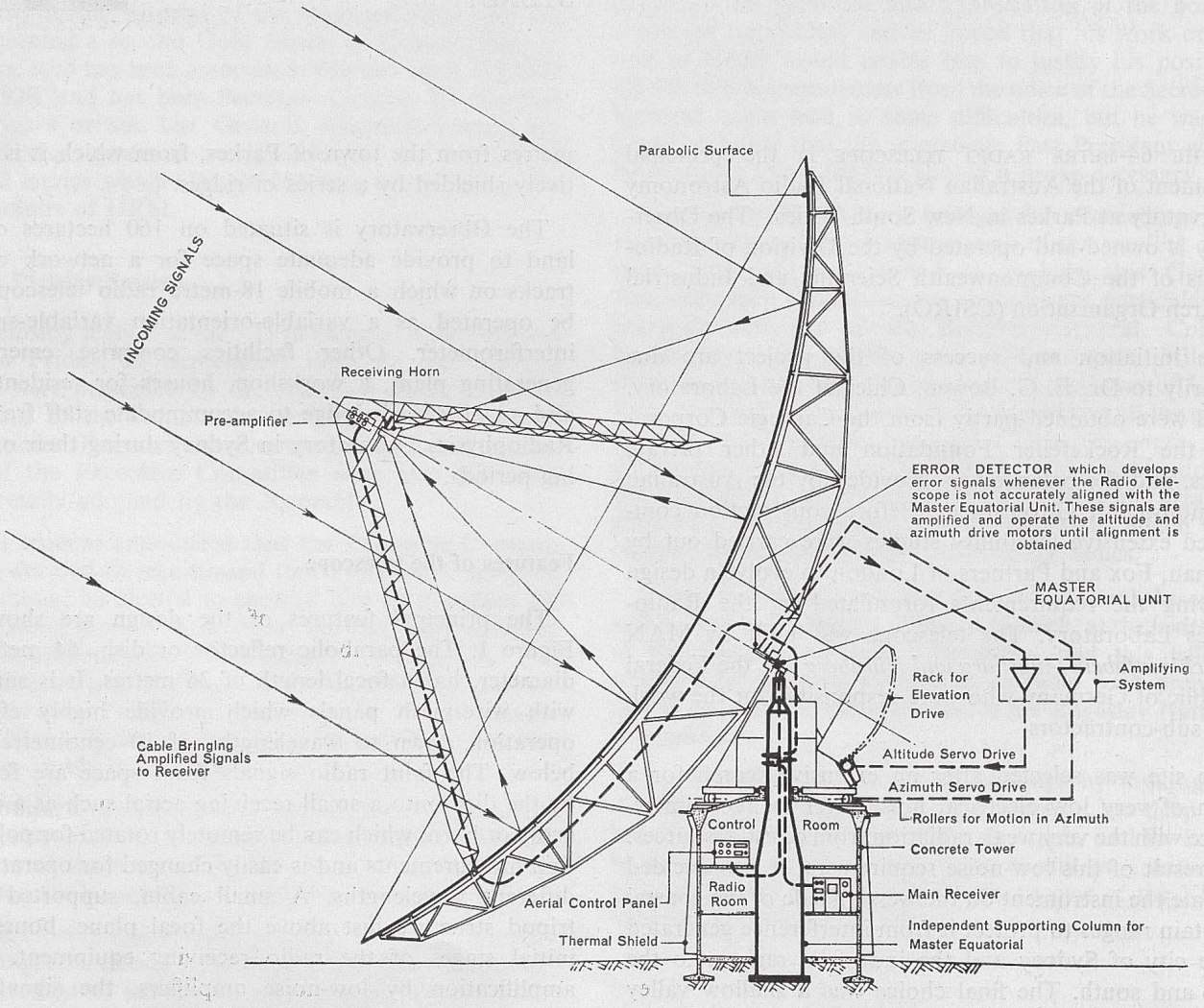
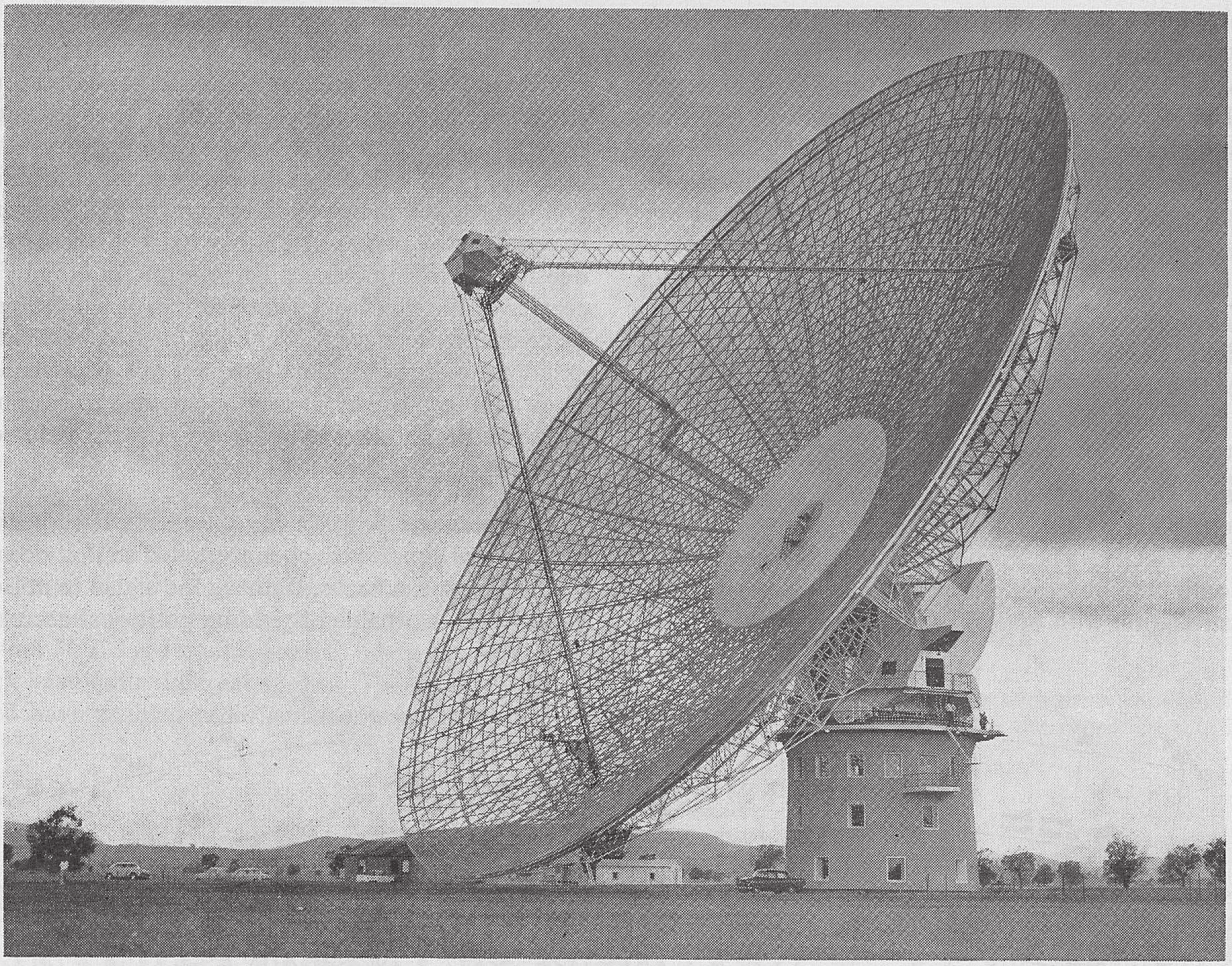

Parabolic Surface
INCOMING SIGNALS
Receiving Horn
Pre-amplifier
ERROR DETECTOR which develops error signals whenever the Radio Telescope is not accurately aligned with the Master Equatorial Unit. These signals are amplified and operate the altitude and azimuth drive motors until alignment is obtained
MASTER EQUATORIAL UNIT
Amplifying System
Rack for Elevation Drive
Altitude Servo Drive
Azimuth Servo Drive
Cable Bringing Amplified Signals to Receiver
Control Room
Rollers for Motion in Azimuth
Concrete Tower
Radio Room
Main Receiver
Aerial Control Panel
Independent Supporting Column for Master Equatorial
Thermal Shield

Figure 1 — How the radio telescope operates *(Design: CSIRO)*



The Parkes radio telescope (Photo: CSIRO)

type in which the received radiation is compared continuously with the radiation from reference resistors cooled by liquid nitrogen or with the output from small horns pointing to another part of the sky. The two shortest wavelength receivers have parametric amplifiers of the degenerate type. A 6-7 cm receiver is under development.

Two receivers have been installed for observations of the important 21 cm line radiation from hydrogen atoms. A 48-channel equipment is used for work on our own Galaxy and the Magellanic Clouds. The second is a single channel, double-parametric system used for observations of distant galaxies.

Elaborate precautions have been taken to eliminate electrical interference with the extremely sensitive receiving equipment. The whole electrical system is thoroughly screened. In particular the servo-amplifying and drive machinery is totally enclosed and provided with special gaskets on removable covers and with radio filters on the ventilating air supplies.

Some research results

Full-time radio astronomy research with the Parkes telescope commenced early in 1962 and a considerable number of separate investigations are now in progress. There is only space enough in this article to mention a few of the results achieved, some of which are a direct consequence of the design features and performance of the new instrument.

One of the most important discoveries was greatly assisted by the ease with which the polarization and wavelength of reception can be changed. The search for linearly polarized radiation has been of great interest for many years because radiation generated by high-speed electrons interacting with a magnetic field would be expected to be polarized in this way. This " synchrotron " mechanism was thought to be responsible for the high level radiation from certain sources, but until recently linear polarization had been detected only in the Crab Nebula and the " van Allen belt " of Jupiter.

Observations by Bracewell, Cooper and Cousins have now established a high degree of linear polarization in Centaurus-A at wavelengths of 10 and 21 cm. Polarization has also been detected by Gardner and Whiteoak in a number of radio galaxies and supernova remnants. This work, together with 3.15 cm observations in the United States of America, now provides strong evidence for the existence of magnetic fields systematically aligned over very large distances of Space and demonstrates the correctness of the synchrotron theory of generation in many objects.

The existence of a magnetic field system in our own Galaxy has been clearly shown in a further discovery at Parkes resulting from the observation by Cooper and Price that the plane of polarization of the radiation from Centaurus-A and a number of other radio sources changes with wavelength. The angle of rotation was

found to be closely proportional to the inverse square of the frequency as would be expected for Faraday rotation of the wave when passing through a magnetic field. The location of the Faraday medium in our own Galaxy was confirmed by Gardner and Whiteoak from the way in which the degree of rotation changed with direction (and therefore length of path) through the Galaxy.

The great value of the high resolving power and gain of the new telescope is well illustrated by studies of the Magellan Clouds, the nearest galaxies to our own. This region of the sky is being surveyed in detail both in the 21 cm hydrogen-line radiation and in 21 cm and 75 cm continuum radiation.

Figure 2 shows brightness contours of 21 cm hydrogen-line emission from the Large Magellan Cloud observed by R. X. McGee. These contours, like those resulting from continuum observations at 21 cm, show particularly good correlation with optical photographs of the Clouds

at present limited to about 1 minute of arc, not by the precision of the instrument itself, but by the scarcity of sources of accurately known positions in these regions. Nevertheless ten identifications have been obtained by Bolton and Westerlund between declinations of −35° and −65° and it is planned to use such identifications to establish a temporary calibration grid. Although an uncertainty of perhaps 0′.2 may exist in these positions due to lack of coincidence between the radio and optical centres of the objects, it is hoped that it will be sufficient to enable more distant identifications to be made. The assumption of coincident centres will itself cause less error and, in this way, it may be possible to continuously improve the positional accuracy of the telescope in southern regions.

Very accurate position measurements have been made at Parkes of sources which are situated so that occultation by the Moon can occur. With a good signal to noise ratio, the method is capable of yielding positional accuracies of

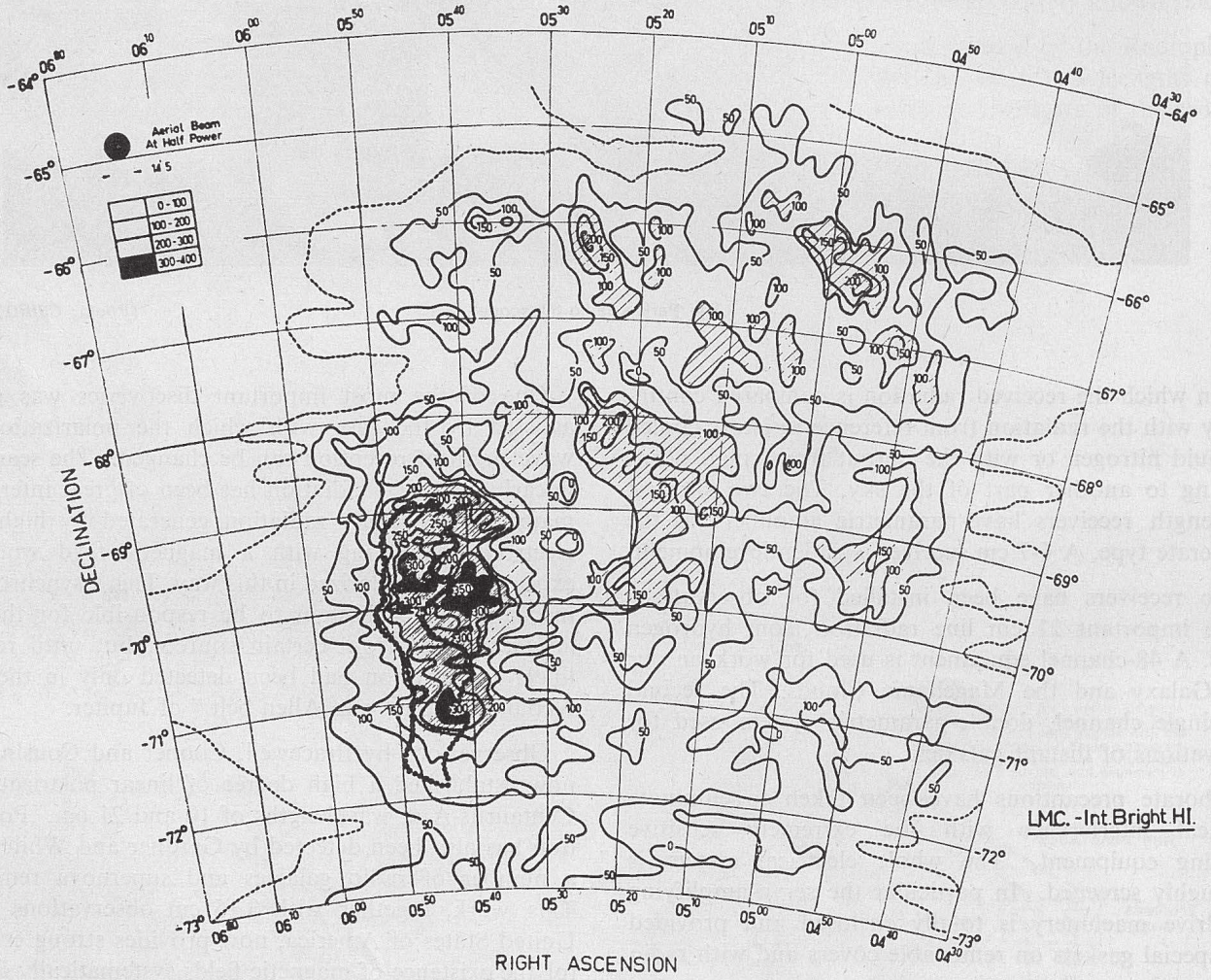


Figure 2

and reveal many fine details of the radio structure for the first time.

High positional accuracy is required for the identification of distant radio galaxies. As stated above, the absolute accuracy of position measurements with the 64 m telescope in regions of high southerly declination is

the order of 1 second of arc although in practice errors of up to 18 seconds may be introduced by lack of detailed knowledge of the Moon's topography.

The high gain and the wide range of precise movement of the 64 m telescope are admirably suited to this technique and about ten complete occultations have, so far,

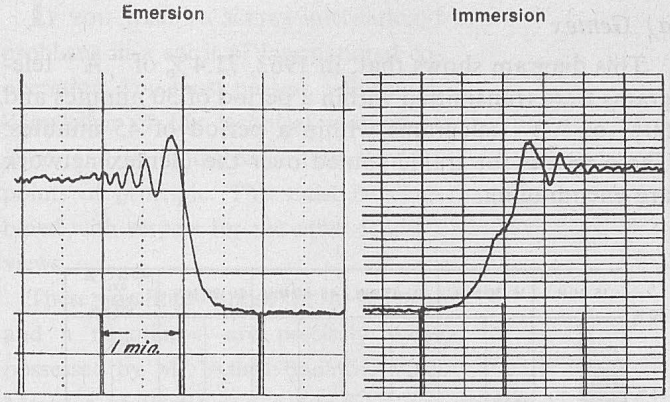


Figure 3 — 3C273 occultation — 410 Mc/s - 5-8-62 *(Diagram: CSIRO)*

been observed. With small sources a diffraction pattern results as in Figure 3, which shows the 75 cm occultation of the source 3C273. Together with observations taken at other frequencies from 11 to 220 cm, these results have shown that 3C273 is a double source, the two components of which have quite different spectra. The radio positions obtained have enabled radio astronomers, working with the 5-metre telescope at Mount Palomar, to identify 3C273 as one of a rare class of objects, only four examples of which have been identified from the previous radio observations. In the case of 3C273, Californian astronomers have now been able, for the first time, to identify the lines in the spectrum of the optical object and to show that it is a very distant star and not a galaxy. Such objects belong to an entirely new class and may have great cosmological significance.

The above is necessarily only a brief selection from the results so far achieved. It is already clear that the new telescope is destined to play an important part in research into the nature of the Universe.

(Original language : English)

References

E. G. Bowen and H. C. Minnett, " The Australian 210-foot radio telescope," *Proceedings IRE (Aust.)*, vol. 24, pp. 98-105, February, 1963.

J. G. Bolton, " Radio astronomy with the Australian 210-foot telescope," paper submitted to the *Proceedings IEEE.*

SPEED OF TRANSMISSION OF INTERNATIONAL TELEGRAMS

A yearly survey called for by the CCITT

From Recommendation F.90 of the CCITT
(Red Book – Volume IIbis)

The CCITT,

CONSIDERING

1. the present speed of communications by telephone and by airmail;
2. the need for Administrations and Private Operating Agencies to be acquainted with the times of transmission of telegrams:
   a) to enable them to seek means of improving such times of transmission;
   b) in order that they may possess factual data enabling them to judge the adequacy of the service;
3. that to meet the above needs it is necessary to be able to base comparisons on representative statistics relating to the largest possible number of important international circuits,

UNANIMOUSLY DECLARES THE VIEW

1. that all Administrations and Private Operating Agencies should have statistics compiled each year of the transmission time of international telegrams, drawn up by the receiving office . . .

In reproducing this extract from CCITT Recommendation F.90, the General Secretariat wishes once again to draw the attention of Administrations and private operating agencies to the usefulness of having as wide as possible a participation in their survey.

Statistics concerning the speed of transmission of international telegrams are prepared each October. " A " telegrams are those originating in the sending office, while " B " telegrams are those originating in offices other than the sending office but in the same country as the latter. " Speed of transmission " is the period elapsing between the time when the telegram is accepted at the originating office (acceptance time) and the time when it is received at the destination office (reception time), allowing for differences in local time where necessary.

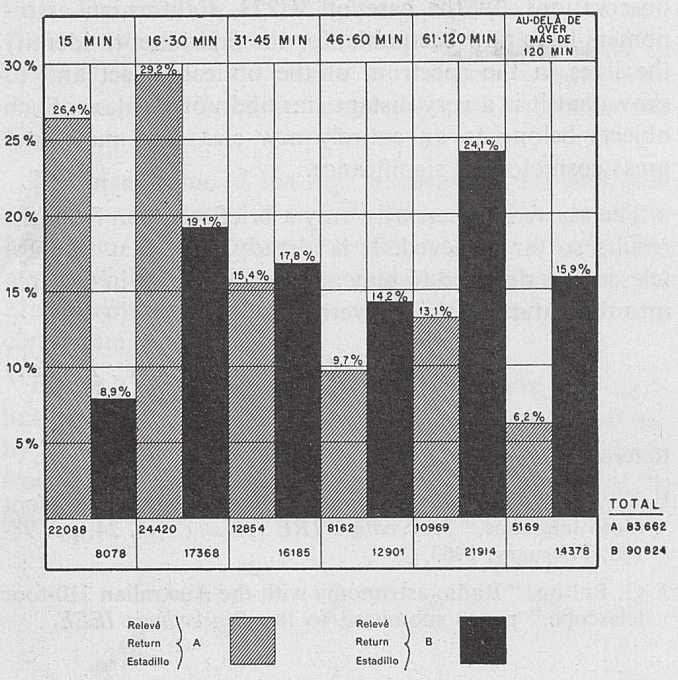
The data supplied by the receiving offices for the past year have been forwarded to the sending offices concerned by the General Secretariat of the ITU.

In 1962, 56 Administrations and five recognized private operating agencies sent us these statistics, which had involved the examination of 174 486 telegrams, split up as follows:

Return " A "	Gentex	27 815	telegrams
	Station to station	55 847	telegrams
Return " B "	Gentex	22 155	telegrams
	Station to station	68 669	telegrams

The diagram advocated by Recommendation F.90 is given below; it shows the percentage of telegrams in

Returns " A " and " B " disposed of within the periods shown.



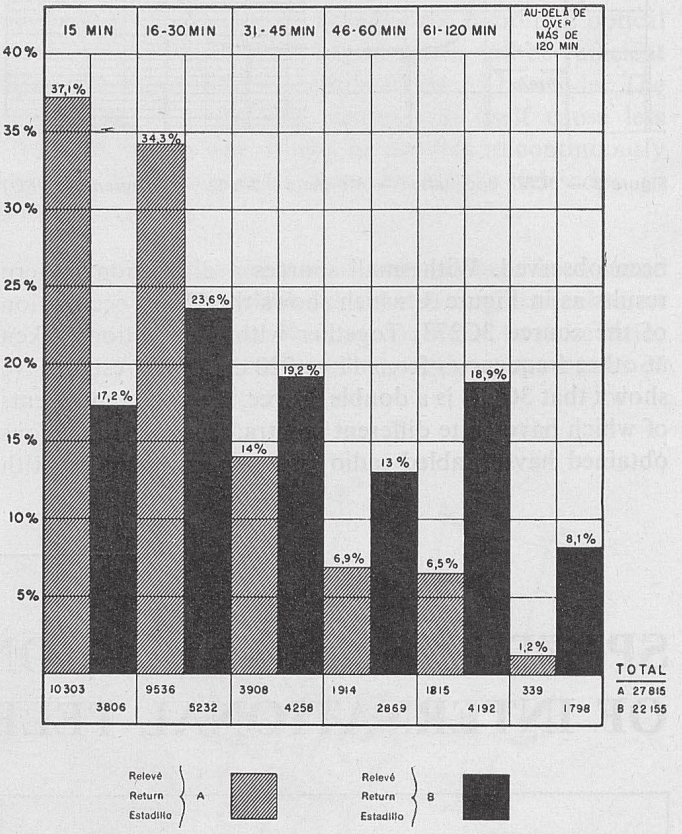
If we consider the desire expressed in Recommendation F.90—i.e. that 75% of " A " telegrams should be transmitted within a period of 30 minutes, and 75% of " B " telegrams within a period of 45 minutes—in the light of the results shown in the following table, we are forced to admit that the objective has not been attained since 1948.

Year	Return A		Return B	
	Telegrams	Percentage disposed of within 30 minutes	Telegrams	Percentage disposed of within 45 minutes
1948	36 707	36.6%	29 914	40.6%
1949	54 411	39.5%	45 264	42.8%
1950	68 286	42.4%	57 777	47.1%
1951	74 230	41.8%	62 201	42.3%
1952	73 778	45.2%	65 196	47.5%
1953	90 040	54.1%	73 642	54.4%
1954	92 013	57.0%	77 590	60.0%
1955	101 922	52.4%	85 653	56.0%
1956	99 963	53.2%	84 111	51.9%
1957	97 535	54.8%	80 720	53.4%
1958	99 588	58.5%	80 916	55.8%
1959	77 466	60.8%	80 943	53.7%
1960	93 083	54.9%	94 478	48.0%
1961	91 655	55.3%	97 910	46.3%
1962	83 662	55.6%	90 824	45.8%

It must nevertheless be pointed out that, with the developments in the Gentex network, the speed of transmission of telegrams sent over this network has appreciably improved. For this reason the General Secretariat considered it advisable to separate the data on transmission speeds for telegrams sent over the Gentex network from those relating to " station to station " telegrams, with the following results:

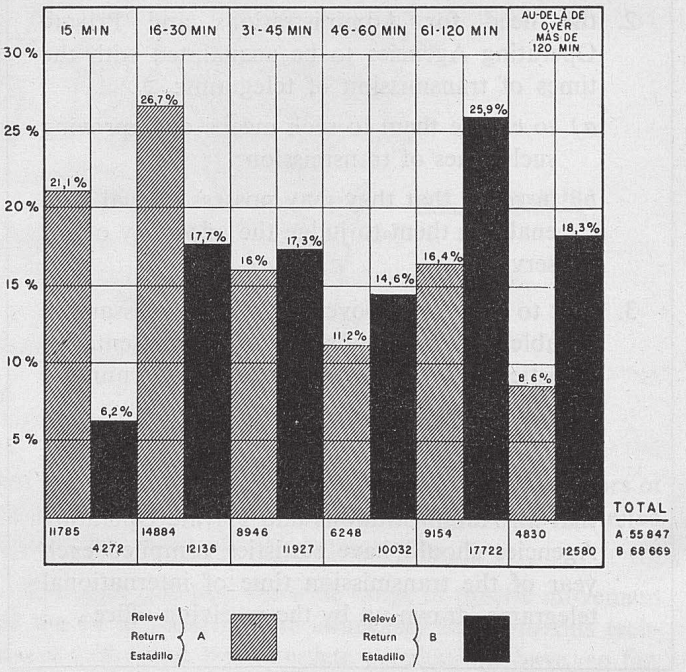
a) Gentex

This diagram shows that, in 1962, 71.4% of " A " telegrams were transmitted within a period of 30 minutes and 60% of " B " telegrams within a period of 45 minutes. These results for traffic routed over the Gentex network are encouraging.



b) Station to station

With 47.8% of " A " telegrams transmitted within a period of 30 minutes and 42.2% of " B " telegrams within a period of 45 minutes, the results for " station to station " telegrams are not so satisfactory.



IF YOU WISH TO SETTLE international problems in a spirit of international co-operation, you must possess a thorough knowledge of the technical matters at issue, and be at the same time firm on points of principle. This must be combined with respect for the other fellow's views.

These qualities—those of a scientist and a negotiator—are precisely those possessed by Mr. Ashot Badalov, Vice-Minister of Postal and Electrical Communications of the Union of Soviet Socialist Republics.

telepersonality

36 — ASHOT BADALOV

Mr. Badalov was born in 1915, son of simple peasants, whose robust common sense he inherits. He spent the first few years of his life in Banazur, a little village in the Caucasus, destined to be transformed by the October Revolution, which was to change a good many lives as well.

For the young Badalov, the Revolution meant an opportunity, which he would not otherwise have had, to acquire knowledge. Endowed by nature with much curiosity and inventiveness, he became passionately interested in wireless, then a novelty. He built crystal sets, and then valve-type sets, more or less by himself. At seventeen, as the most natural thing in the world, he chose to become a radio engineer.

In 1932, Badalov entered the Institute of Electrotechnical Communications at Tbilisi, Georgia. In 1937, he graduated as a wireless engineer. Thereafter he was to deal with the whole of the Soviet communications network—a field which gave him ample scope for his qualities as a man of action and an organizer.

Badalov very soon became departmental head in a regional administration, then head of a radio centre. Speedily called to higher spheres, he became head of department in the central radio administration, then director of radio in the Ministry of Postal and Electrical Communications. In March of this year, he was appointed Vice-Minister of Communications.

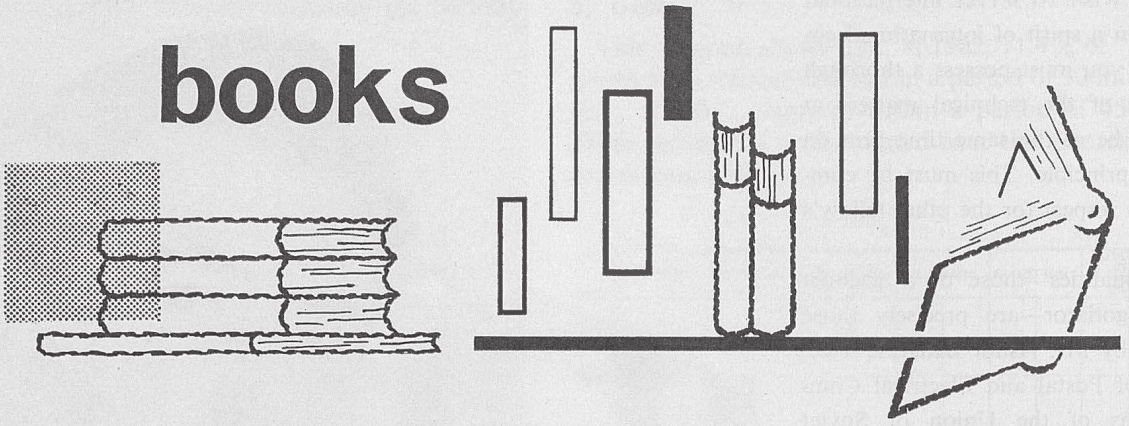
His multiple duties do not prevent him, concerned as he is with the future, from being interested in international affairs. For him, the International Telecommunication Union (ITU) provides an ideal setting for fruitful international co-operation in telecommunication matters. Beginning in 1948, he took part in Brussels in the work of the Committee responsible for preparing a frequency allocation plan for LF and MF broadcasting in countries of the European Broadcasting Area. He then attended the Copenhagen Conference where, with other members of the Soviet delegation, he signed the European Broadcasting Convention and the Copenhagen Plan.

We shall not attempt to list all the ITU conferences which Mr. Badalov has attended. He did, however, make his contribution at the Administrative Radio Conference (1959), the European Broadcasting Conference in Stockholm (1961), the Washington meeting of Study Group IV of the International Radio Consultative Committee (CCIR), the Plenary Assembly of the International Radio Consultative Committee in Geneva, and lastly, in October of this year, the Space Radio Conference, at which he was Vice-Chairman as well as Head of the Soviet Delegation.

How Ashot Badalov finds time to read, to do his gardening, to go to the theatre, and to relax with his family, in the midst of all his multifarious activities is a secret which only his friends can pierce. However, the fact remains that, despite the busy life he leads, he finds time to relax, as do all men of action and all really strong personalities.—**R. F.**

(Original language: French)

books



EINFÜHRUNG IN DIE PHYSIK DES TRANSISTORS (Introduction to the physics of the transistor), by W. W. Gärtner.[1]

The wide application of transistors in modern communication equipment stipulates some detailed knowledge in the physics of semiconductors.

The book informs on the physical behaviour of semiconductors and *p-n* junctions. All types of transistors are explained and their use and electrical parameters discussed.

Each chapter is closed by questions enabling the reader to check whether the most important points have been fully understood.

W. Menzel

[1] One bound volume; pp. XII+319, illustrations, tables, diagrams. 24×16 cm. Published by *Springer-Verlag*, Berlin, Göttingen, Heidelberg, 1963. Price 44 German marks.

●

ORTSNETZPLANUNG (Planning of local exchange networks), by Heinrich Kremer.[2]

In Germany there has long been a need for a comprehensive survey of local telecommunication networks, describing the methods which have evolved over the last few decades and summarizing the results of such planning for practical use.

The work which has just appeared is based on extensive numerical data, evaluated by statistical testing processes. It thus provides a basis for modern planning methods.

In addition to planning processes current in Germany, some reference is made to principles of planning in other countries.

Local network planning involves not merely technical, but primarily economic problems. The present work mentions, therefore, several examples of methods of calculating economy in management and elucidates the principles of such examinations.

Particular value is attached to conclusions which are, as far as possible, universally valid and have been arrived at as a result of modern model systems, and also enable use to be made of electronic computers for planning purposes.

Local network planning touches the basic nature of other aspects of telephone technique (exchanges, transmission, etc.). It is thus a necessity for all telecommunication experts—particularly planning engineers—even if they are not engaged on actual planning of local networks but are concerned with main systems, exchanges or transmitters. But even telecommunication engineers and technicians who construct or operate such plants or supervise their construction will find in this book useful data for their work.

A. El-Zanati

[2] One bound volume; pp. 180, illustrations, tables. 22×15 cm. Published by *Fachverlag Schiele und Schön, GmbH*, Marktgrafenstrasse 11, Berlin, 1963. Price 19.50 German marks.

●

CARRIER COMMUNICATION OVER POWER LINES, 3rd entirely rewritten edition of the book: Dressler/Podszeck *Hochfrequenz-Nachrichtentechnik für Elektrizitätswerke*, by Heinrich-Karl Podszeck.[3]

The third edition meets the need to keep up to date with the rapid developments in power and carrier communication engineering. Power lines have been used for quite some time as communication media for telephony and telemetry. In recent years, however, these communication networks have expanded so as to cover entire countries. Power and communication engineers engaged in the development of equipment and in the design and maintenance of entire systems will find a valuable compilation of experience data as well as suggestions for their application. The present state of the art is described, without indulging in lengthy arithmetic, and an outlook is given on future developments. It has been the purpose of the author to afford system managers, load dispatchers and workers in related fields a convenient and quick means of information, unhampered by reading matter of nothing more but historical interest.

A. El-Zanati

[3] One bound volume; pp. VIII+181, illustrations, tables. 24×16 cm. Published by *Springer-Verlag*, Heidelberger Platz 3, Berlin-Wilmersdorf, 1963. Price 36 German marks.

●

TRANSISTOREN TASCHENBUCH (Transistor reference book), by Werner Taeger [4].

After a short introduction to the physics of the transistor and its technical application, the book shows a detailed list of transistors manufactured in Germany. This list contains the characteristics in a new and standardized form so that the properties of transistors of different firms can easily be compared.

W. Menzel

[4] One volume, paper cover; pp. 280, illustrations, tables, diagrams. 21×14 cm. Published by *Fachverlag Schiele und Schön GmbH*. Marktgrafenstrasse 11, Berlin SW 61, 1963. Price 22 German marks.

review

review

A list of articles in other technical publications which may be of interest to readers of the Journal. The articles are listed under the language of the publication.

FRENCH

Annales des télécommunications. 3 et 5, bd Pasteur, Paris 15e. Années 1963. **Nos 7-8.** P. 141-162. *Dubost, G.* Amplificateur en hyperfréquences à large bande utilisant des éléments à résistance négative.

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official announcements

INTERNATIONAL TELECOMMUNICATION CONVENTION (GENEVA, 1959)

Guatemala has acceded to the International Telecommunication Convention (Geneva, 1959).

The instrument of accession was deposited with the General Secretariat of the Union on 17 October, 1963.

The **Republic of the Sudan** has ratified the International Telecommunication Convention (Geneva, 1959).

The instrument of ratification was deposited with the General Secretariat of the Union on 21 October, 1963.

RADIO REGULATIONS,
ADDITIONAL RADIO REGULATIONS
(GENEVA, 1959)

The Governments of the **Group of Territories represented by the French Overseas Post and Telecommunication Agency, Luxembourg, Portugal** and the **Portuguese Overseas Provinces,** the **Republic of South Africa** and **Territory of South-West Africa** have approved the Radio Regulations and the Additional Radio Regulations (Geneva, 1959).

TELEPHONE REGULATIONS (GENEVA, 1958)

The Administration of the **Kingdom of Laos** has approved the Telephone Regulations (Geneva, 1958).

INTERNATIONAL TELEGRAPH AND TELEPHONE CONSULTATIVE COMMITTEE (CCITT)

The **Hughes Aircraft Company**, Los Angeles, California, has asked to participate, as an industrial organization, in the work of the CCITT.

The **Stanford Research Institute**, Menlo Park, California, has asked to participate, as a scientific organization, in the work of the CCITT.

These requests have been approved by the United States Administration.

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VACANT POST ADVERTISEMENTS

IN THE GENERAL SECRETARIAT

A P4 post of Chief of the English Translation Section in the General Secretariat of the Union has been advertised by Circular letter No. 1669/55/60/Pe, of 31 October, 1963, which has been sent to all ITU Member Administrations.

Only applications forwarded through Administrations can be considered.

IN THE CCITT

A G6 post of Operator (tests in laboratory) in the Specialized Secretariat of the International Telegraph and Telephone Consultative Committee (CCITT), in Geneva, has been advertised by Circular letter ITU/1669/55/61/Pe dated 31 October, 1963, which has been sent to all ITU Member Administrations.

In view of the technical requirements of this work a woman's voice is necessary. Therefore only women candidates will be considered.

Duration of appointment: fixed term appointment until 31 March, 1965, with possible extension if considered necessary by CCITT Study Group XII.

Only applications forwarded through Administrations can be considered.

Calendar of ITU conferences and meetings

Date	Title	Place
1963		
	International Telegraph and Telephone Consultative Committee (CCITT) and **International Radio Consultative Committee (CCIR):**	
25 November-11 December	Plan Committee	Rome
1964		
	African LF/MF Broadcasting Conference:	
20 January-8 February	**Preparatory meeting of experts**	Geneva
27 January-21 February	**Extraordinary Administrative Radio Conference for the preparation of a Revised Allotment Plan for the Aeronautical Mobile (R) Service**	Geneva
6 April-9 May	**ITU Administrative Council** (19th Session)	Geneva
	International Radio Consultative Committee (CCIR):	
14-25 February	Sub-Group on colour television of Study Group XI	London
	International Telegraph and Telephone Consultative Committee (CCITT) :	
27-31 January	Joint Special C Study Group (Circuit noise)	Geneva
3-7 February	Study Group III (Tariff principles and lease of circuits)	Geneva
10-14 February	Working Party of Study Groups I and X (Intercontinental telex signalling)	Geneva
25 May-27 June	IIIrd Plenary Assembly (including associated meetings of study groups)	. . .
7-26 September	**African LF/MF Broadcasting Conference**	Madrid

Invitations accepted to conferences or meetings external to the Union

Date	Organization	Nature of conference or meeting	Place	Representatives
1963				
27 November-4 December	Economic Commission for Asia and the Far East (ECAFE)	12th Session of the Inland Transport and Communications Committee	Bangkok	Mr. K. V. PAI (ITU's expert)

INTERNATIONAL RADIO CONSULTATIVE COMMITTEE (CCIR)

Smoothed monthly sunspot numbers **1st December 1963**

Predictions for the coming months:

1963	**December**	**21**	**1964**	**January**	**20**
				February	**19**
				March	**18**
				April	**17**

(Values kindly provided by Prof. Waldmeier, Federal Observatory, Zurich)

List of recent and forthcoming publications of the International Telecommunication Union

The following letters indicate the languages in which documents are published:

F *for French* S *for Spanish*
E *for English* R *for Russian*
C *for Chinese*

Prices are in Swiss francs

Note

A comprehensive list of all the publications of the Union will be supplied free on request.

I. Publications issued since the last number of the Journal

Summary of Monitoring information received by the IFRB

No. 87 (August, 1963)
Trilingual edition **F, E, S.**

General telephone statistics, year 1962
Trilingual edition **F, E, S.**

List of international telex circuits, on 31 December, 1962
Trilingual edition **F, E, S.**

International Radio Consultative Committee (CCIR) :

Xth Plenary Assembly, Geneva 1963

Volume II. **Propagation**
Volume V. **Sound broadcasting. Television**
English edition

II. Forthcoming publications

Final Acts of the African VHF/UHF Broadcasting Conference, Geneva, 1963:

Regional Agreement for the African Broadcasting Area
Tables of distances to be used
Plans for the assignment of VHF/UHF
Technical data considered
Final Protocol — Resolutions and recommendations

Separate editions in **F, E, S.**

Summary of Monitoring information received by the IFRB

No. 88 (September, 1963)
Trilingual edition **F, E, S.**

High frequency broadcasting schedules

(4 publications per annum).
Trilingual edition **F, E, S.**

Alphabetical List of call-signs of maritime mobile service stations

(List VII A), 2nd edition, October, 1963.
Multilingual edition **F, E, S, R, C.**

List of coast stations, 2nd edition, 15 December 1963

Trilingual edition **F, E, S,** possibly **R, C.**

List of ship stations, 4th edition, December 1963

Trilingual edition **F, E, S.**

List of broadcasting stations operating in bands between 5950 and 26 100 kc/s, first edition, September 1960-August 1961
Trilingual edition **F, E, S.**

International Radio Consultative Committee (CCIR) :

IXth Plenary Assembly, Los Angeles, 1959
Addendum No. 3 to the volumes I, II and III.
Spanish edition.

Xth Plenary Assembly, Geneva, 1963

Vol. I — Emission. Reception. Fixed Service. Vocabulary.
Vol. II — Propagation. **Spanish** edition.
Vol. III — Mobile Service. Standard Frequencies and Tim Signals. Monitoring.
Vol. IV — Radio Relay Systems. Space Systems. Radio astronomy. **Spanish** edition.
Vol. V — Broadcasting. Television. **Spanish** edition.
Vol. VI — Resolutions and Opinions of a general nature. List of Participants. Reports of the Director, the Finance Committee, etc.
Vol. VII — Minutes of the Plenary Sessions.

Separate editions in **F, E, S.**

International Telegraph and Telephone Consultative Committee (CCITT) :

Codes and abbreviations for use in international telecommunication, 2nd edition,
Editions in separate languages **F, E, S.**

Directives.
Editions in separate languages **F, E, S.**

IInd Plenary Assembly, New Delhi, 1960
Red Book.
Vols. V and VII. **Spanish** edition.

Conditions of sale

All documents ordered from the General Secretariat of the ITU (Place des Nations, Geneva, Switzerland) must be paid for in advance. Documents must be paid for in Swiss francs when they are ordered, unless a cash-on-delivery arrangement is requested

Methods of payment:

a) Switzerland: postal cheque account - *Genève I. 50.*

b) Other countries: international postal order or bank transfer on the *Société de Banque Suisse*, Geneva.

The prices quoted include packing costs and carriage by surface mail.
As the General Secretariat of the ITU sells its publications on a non-profit making and non-discount basis, no reduction can be made to booksellers.

Le développement du service télex international

(Voir Note explicative au verso)

Trafic télex de départ et d'arrivée (janvier 1963) en minutes taxées par rapport au nombre de circuits directs en service (quelques-uns des chiffres sont approximatifs par suite de différences dans les données fournies)
Les chiffres figurés sous la forme 0 indiquent le nombre de circuits directs mais aucun échange de minutes n'a été enregistré durant le mois considéré. Les cases sans chiffres indiquent qu'il n'y a pas de trafic télex dans le réseau considéré.

Development of the international telex service

(See Explanatory Note on the back)

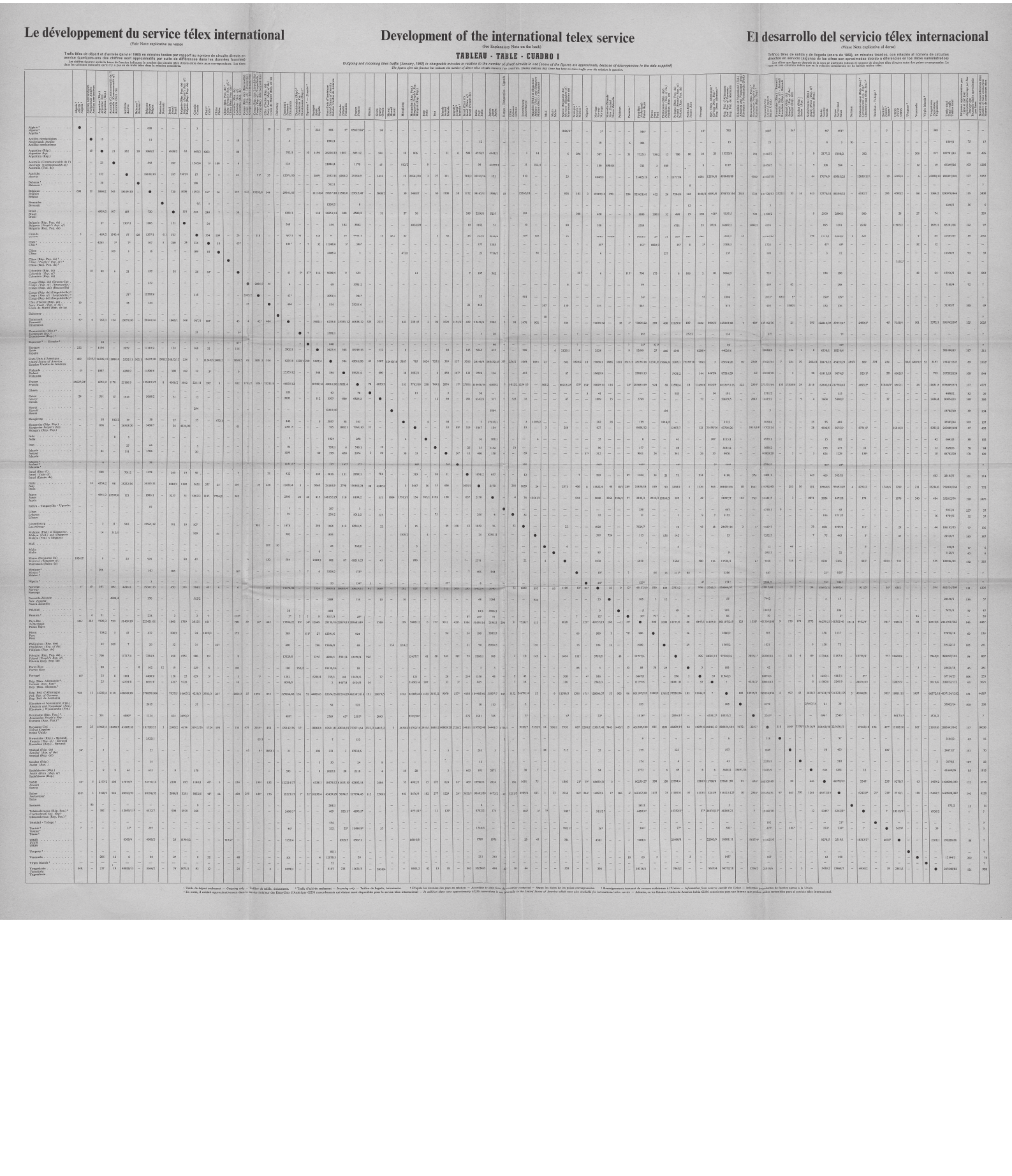
TABLEAU - TABLE - CUADRO I

Outgoing and incoming telex traffic (January, 1963) in chargeable minutes in relation to the number of direct circuits in use (some of the figures are approximate, because of discrepancies in the data supplied)
The figures given like fractions but indicate the number of direct telex circuits between two countries. Dashes (hiatus) but there has been no telex traffic over the relation in question.

El desarrollo del servicio télex internacional

(Véase Nota explicativa al dorso)

Tráfico télex de salida y de llegada (enero de 1963), en minutos tasados, con relación al número de circuitos directos en servicio (algunas de las cifras son aproximadas debido a diferencias en los datos suministrados)
Las cifras que figuran como fracciones indican solamente el número de circuitos directos entre dos países corresponsales. Las rayas en una columna indican que en la relación considerada no ha habido tráfico télex.


Algeria (Rep.) / Algeria / Argelia
Antilles néerlandaises / Netherlands Antilles / Antillas neerlandesas
Argentina (Rep.) / Argentine Rep. / Argentina (Rep.)
Australia (Commonwealth of) / Australia (Comm. of) / Australia (Com.)
Australia (Ind. de) / Australia (Dep. of) / Australia (Dep.)
Austria / Autriche / Austria
Belgium / Belgique / Bélgica
Bermuda / Bermudes / Bermudas
Brazil / Brésil / Brasil
Bulgaria (Rep. Pop. de) / Bulgaria (People's Rep. of) / Bulgaria (Rep. Pop.)
Canada / Canada / Canadá
Chile / Chili / Chile
China / Chine / China
China (Rep. Pop. de) / China (People's Rep. of) / China (Rep. Pop.)
Colombia (Rep. de) / Colombia (Rep. of) / Colombia (Rep.)
Congo (Rép. du) (Brazzeville) / Congo (Rep. of) (Brazzeville) / Congo (Rep. del) (Brazzeville)
Congo (Rép. du) (Léopoldville) / Congo (Rep. of) (Leopoldville) / Congo (Rep. del) (Leopoldville)
Côte d'Ivoire (Rép. de) / Ivory Coast (Rep. of the) / Costa de Marfil (Rep. de la)
Dahomey
Danemark / Denmark / Dinamarca
Dominicaine (Rép.) / Dominican Rep. / Dominicana (Rep.)
Ecuador / Equateur
Espagne / Spain / España
Etats-Unis d'Amérique / United States of America / Estados Unidos de América
Finlande / Finland / Finlandia
France / Francia
Ghana
Grèce / Greece / Grecia
Guinée / Guinea / Guinea
Haïti / Haiti / Haití
Hongrie / Hungary / Hungría
Islande / Iceland / Islandia
Israël (Etat d') / Israel (State of) / Israel (Estado de)
Italie / Italy / Italia
Japon / Japan / Japón
Kenya - Tanganyika - Uganda
Liban / Lebanon / Líbano
Luxembourg / Luxemburgo
Malaisie (Fed. de) / Malaysia (Fed. of) / Malasia (Fed.)
Mali
Malte / Malta
Maroc (Royaume du) / Morocco (Kingdom of) / Marruecos (Reino de)
Mexique / Mexico / México
Monaco
Nigeria
Norvège / Norway / Noruega
Nouvelle-Zélande / New Zealand / Nueva Zelandia
Pakistan
Panama
Pays-Bas / Netherlands / Países Bajos
Pérou / Peru / Perú
Philippines (Rép. des) / Philippines (Rep. of the) / Filipinas (Rep. de)
Pologne (Rép. Pop. de) / Poland (People's Rep. of) / Polonia (Rep. Pop. de)
Porto-Rico / Puerto Rico
Portugal
Rép. Dem. Allemande / German Dem. Rep. / Rep. Dem. Alemana
Rép. Fed. d'Allemagne / German Fed. Rep. / Rep. Fed. de Alemania
Rhodésie et Nyassaland (Fédération de) / Rhodesia and Nyasaland (Fed.) / Rodesia y Nyasalandia (Fed.)
Roumanie (Rép. Pop.) / Romania (People's Rep.) / Rumania (Rep. Pop.)
Royaume-Uni / United Kingdom / Reino Unido
Rwandaise (Rép.) - Burundi / Rwanda-Burundi / Ruandesa (Rep.) - Burundi
Singapour (Etat de) / Singapore (State of) / Singapur (Estado de)
Soudan (Rép. du) / Sudan (Rep. of the) / Sudán (Rep.)
Suède / Sweden / Suecia
Suisse / Switzerland / Suiza
Tchécoslovaque (Rép. Soc.) / Czechoslovak Soc. Rep. / Checoslovaca (Rep. Soc.)
Trinidad - Tobago
Tunisie / Tunisia / Túnez
Turquie / Turkey / Turquía
URSS / USSR / URSS
Uruguay
Venezuela
Vierge (Iles) / Virgin Islands / Vírgenes (Islas)
Yougoslavie - Fédérative Populaire / Yugoslavia - Federal People's Rep. / Yugoslavia - Federativa Popular
Zanzibar / Zanzibar / Zanzíbar
Réponses supplémentaires des pays non-européens / Additional answers from non-European countries / Respuestas suplementarias de los países no europeos

† Trafic de départ seulement — Outgoing only — Tráfico de salida, solamente. † Trafic d'arrivée seulement — Incoming only — Tráfico de llegada, solamente. ‡ D'après les données des pays en relation — According to data from the countries concerned — Según los datos de los países correspondientes. * Renseignements donnant de moins exhaustifs à l'Union — Information from sources outside the Union — Información proporcionada de fuentes ajenas a la Unión.
* En outre, il existait approximativement dans le service intérieur des Etats-Unis d'Amérique 6220 raccordements qui étaient mais disponibles pour le service télex international — In addition there were approximately 6220 connections in use specially in the United States of America telex service — Además, en los Estados Unidos de América había 6220 conexiones más que habían sido utilizadas para el servicio télex internacional.

LE DÉVELOPPEMENT DU SERVICE TÉLEX INTERNATIONAL

Conformément aux termes de l'Avis n° F94 émis par le Comité consultatif international télégraphique et téléphonique (CCITT) (ancien Avis H4 du CCIT), le Secrétariat général de l'Union publie chaque année depuis 1957 les tableaux suivants se rapportant au trafic télex international:

1. tableau général du trafic télex international en janvier, en minutes taxées, par rapport au nombre de circuits directs en service;
2. tableau comparatif du trafic télex international en janvier de différentes années;
3. tableau comparatif du trafic télex international annuel des années 1946 à 1962.

La demande, adressée aux administrations, de fournir les statistiques à paraître en 1963, a fait l'objet d'un télégramme-circulaire que le Secrétariat général a envoyé aux Membres et Membres associés de l'Union le 9 janvier 1963; elle a été réitérée dans la Notification n° 907, du 16 janvier 1963. Quelques rappels individuels ont été envoyés aux administrations, dont plusieurs ont fait toute diligence pour fournir les renseignements demandés.

Les statistiques publiées dans les tableaux annexes couvrent le trafic télex échangé, au total, avec 58 administrations de pays Membres ou Membres associés et/ou territoires dépendant de ces administrations ayant fourni des statistiques. Dix-sept administrations et/ou territoires ont déclaré n'avoir pas encore de service télex en exploitation.

Certaines administrations éprouvant des difficultés à fournir dans un délai assez court le nombre des minutes taxées relatives à leur trafic d'arrivée, le Secrétariat général s'est basé, pour indiquer ce chiffre, sur le nombre des minutes taxées du trafic de départ des administrations correspondantes. Cette manière de procéder a permis d'éliminer les divergences relatives au trafic échangé sur une seule et même relation, pour autant que les deux administrations en correspondance fournissent les renseignements afférents à leur trafic de départ. Par contre, quelques administrations n'ayant fourni aucun renseignement concernant leur trafic, seul le trafic d'arrivée de ces administrations — communiqué comme trafic de départ par les administrations correspondantes — a pu être mentionné dans le Tableau. Dans ces conditions, les chiffres afférents au trafic total (Tableaux I et II) ainsi qu'aux moyennes approximatives par ligne et par jour (Tableau I), pour le mois de janvier 1963, ne reflètent pas exactement la situation dans certaines relations.

DEVELOPMENT OF THE INTERNATIONAL TELEX SERVICE

In accordance with Recommendation No. F94 issued by the International Telegraph and Telephone Consultative Committee (CCITT) (formerly CCIT Recommendation H4), the General Secretariat of the Union has been publishing annually, since 1957, the following tables of international telex traffic:

1. A general table of international telex traffic in January, expressed as the number of chargeable minutes in relation to the number of direct circuits in service;
2. A comparative table showing figures of international telex traffic in January for different years;
3. A comparative table showing annual international telex traffic for the years 1946 to 1962.

The invitation to Administrations to supply figures for publication in 1963 was contained in a circular-telegram from the General Secretariat addressed to Members and Associate Members of the Union on 9 January, 1963, and reproduced in Notification No. 907 of 16 January, 1963. A few Administrations received reminders, upon which several of them supplied figures with alacrity.

The figures published in the annexed tables cover telex traffic exchanged with a total of 58 Administrations of countries, Members or Associate Members, and/or territories coming under those Administrations which supplied figures. Seventeen Administrations and/or territories stated that they had not yet introduced telex services.

Since some Administrations found it difficult to supply figures for the number of chargeable minutes of incoming traffic in good time, the General Secretariat based itself on the number of chargeable minutes of outgoing traffic provided by the corresponding Administrations. By this method, the discrepancies in traffic exchanged over a given relation were eliminated, in so far as both the Administrations concerned supplied information about their outgoing traffic. However, since some Administrations did not supply figures for their traffic, it was only possible to include their incoming traffic (supplied as outgoing traffic by the corresponding Administrations) in the Table. This being so, the figures given for total traffic (Tables I and II) and the rough averages per line per day (Table I), for the month of January 1963, do not reflect the exact position in certain relations.

EL DESARROLLO DEL SERVICIO TÉLEX INTERNACIONAL

De conformidad con la Recomendación N.° F94 formulada por el Comité Consultivo Internacional Telegráfico y Telefónico (CCITT) (antigua Recomendación H4 del CCIT), la Secretaría General de la Unión viene publicando anualmente desde 1957 los siguientes cuadros relativos al tráfico télex internacional:

1. Un cuadro general del tráfico télex internacional del mes de enero, expresado por el número de minutos tasados con relación al número de circuitos directos en servicio,
2. Un cuadro comparativo del tráfico télex internacional del mes de enero de varios años, y
3. Un cuadro comparativo del tráfico télex internacional anual de 1946 a 1962.

En un telegrama circular enviado por la Secretaría General a los Miembros y Miembros asociados de la Unión el 9 de enero de 1963 y publicado el 16 del mismo mes en la Notificación N.° 907, se invitaba a las administraciones a que facilitaran las cifras que han de publicarse en 1963. Se han enviado además recordatorios individuales a algunas administraciones, varias de las cuales han empezado enseguida a remitir la información solicitada.

Las cifras que se insertan en los cuadros anexos se refieren al tráfico télex correspondiente a un total de 58 administraciones de países Miembros o Miembros asociados y/o de territorios dependientes de dichas administraciones que han facilitado datos. Diecisiete administraciones y/o territorios han manifestado que no han establecido aún el servicio télex.

Como ciertas administraciones experimentaban dificultades para indicar en un plazo bastante corto el número de minutos tasados relativos a su tráfico de llegada, la Secretaría General se ha basado, para indicar esta cifra, en el número de minutos tasados del tráfico de salida de las administraciones corresponsales. Este procedimiento ha permitido eliminar las diferencias relativas al tráfico cruzado en una sola misma relación, siempre que las dos administraciones corresponsales faciliten los datos relativos a su tráfico de salida. En cambio, como algunas administraciones no han facilitado ningún dato sobre su tráfico, sólo ha podido indicarse en el Cuadro el tráfico de llegada de las mismas, comunicado como tráfico de salida por las administraciones corresponsales. En estas condiciones, las cifras relativas al tráfico total (Cuadros I y II) y las medias aproximadas por línea y por día (Cuadro I) del mes de enero de 1963, no reflejan exactamente la situación en determinadas relaciones.

TABLEAU - TABLE - CUADRO II

Tableau comparatif du trafic télex de départ et d'arrivée (en minutes taxées)
Comparative table showing outgoing and incoming telex traffic (in chargeable minutes)
Cuadro comparativo del tráfico télex de salida y de llegada (en minutos tasados)

N. B — Les tirets dans les colonnes indiquent que le service télex n'existait pas encore ou que les renseignements font défaut. — *The dashes indicate that the telex service had not yet come into being or that information is lacking.* — La raya en una columna indica que todavía no existía el servicio télex o que no se dispone de datos.

	Juillet *July* Julio 1950	Janvier *January* Enero 1952	Janvier *January* Enero 1953	Janvier *January* Enero 1954	Janvier *January* Enero 1955	Janvier *January* Enero 1956	Janvier *January* Enero 1957	Janvier *January* Enero 1958	Janvier *January* Enero 1959	Janvier *January* Enero 1960	Janvier *January* Enero 1961	Janvier *January* Enero 1962	Janvier *January* Enero 1963
Algérie — *Algeria* — Argelia	—	—	—	—	—	6 371	8 577	25 169	30 763	69 802	114 013	152 252	—
Antilles néerlandaises *Netherlands Antilles* Antillas neerlandesas	—	—	—	—	—	—	—	—	—	—	—	2 353	1 864
Argentine (Rép.) — *Argentine Rep.* — Argentina (Rep.)	—	—	—	—	—	—	—	—	—	—	—	—	—
Australie (Commonwealth de l') *Australia (Commonwealth of)* Australia (Fed. de)	—	—	—	—	—	—	2 822	11 936	28 336	56 822	72 640	89 949	107 781
Autriche — *Austria* — Austria	23 950	52 565	82 884	142 936	233 540	388 232	432 006	462 863	473 827	571 821	677 883	767 122	893 055
Belgique — *Belgium* — Bélgica	44 724	134 382	202 564	245 960	356 628	456 481	569 796	645 713	740 468	813 495	1 081 628	1 112 852	1 290 970
Bermudes — *Bermuda*	—	—	—	—	—	—	—	—	—	—	—	—	1 240
Brésil — *Brazil* — Brasil	—	—	—	—	—	—	1 358	12 207	32 014	—	—	—	—
Bulgarie (Rép. Pop. de) *Bulgaria (People's Rep. of)* Bulgaria (Rep. Pop. de)	—	—	—	—	—	—	8 274	29 384	48 040	62 614	72 654	85 281	
Canada — *Canada*	—	—	—	—	—	5 648	11 416	22 130	48 473	66 275	50 845	66 293	
Chili — *Chile*	—	—	—	—	—	—	—	—	8 233	18 058	—	—	—
Chine — *China*	—	—	—	—	—	—	—	207	727	1 979	6 739	11 658	
Colombie (Rép. de) — *Colombia (Rep. of)* — Colombia (Rep. de)	—	—	—	—	—	—	—	—	7 201	12 567	17 133	15 936	
Congo (Rép. du) (Brazzaville) *Congo (Rep. of) (Brazzaville)* Congo (Rep. del) (Brazzaville)	—	—	—	—	—	—	—	—	—	—	4 453	7 168	
Congo (Rép. du) (Léopoldville) *Congo (Rep. of) (Leopoldville)* Congo (Rep. del) (Leopoldville)	—	—	—	2 700	4 347	6 095	6 377	6 376	12 876	9 640	36 664	—	—
Côte d'Ivoire (Rép. de) *Ivory Coast (Rep. of the)* Costa de Marfil (Rep. de la)	—	—	—	—	—	—	—	—	—	—	—	24 472	31 509
Danemark — *Denmark* — Dinamarca	71 927	111 888	164 201	239 105	330 102	380 782	476 173	550 955	603 343	632 468	727 839	834 647	956 542
Dominicaine (Rép.) — *Dominican Rep.* — Dominicana (Rep.)	—	—	—	—	—	—	—	—	—	503	—	—	—
Espagne — *Spain* — España	—	—	—	—	12 642	12 992	19 808	27 512	45 963	62 931	95 970	152 932	201 480
Etats-Unis d'Amérique *United States of America* Estados Unidos de América	1 069	19 956	28 092	35 571	55 728	82 585	146 652	184 151	233 022	348 895	474 890	667 611	731 427
Finlande — *Finland* — Finlandia	18 933	25 145	33 871	41 789	62 809	93 611	112 373	118 157	142 890	164 743	213 547	272 186	317 252
France — *France*	60 710	153 048	172 995	244 538	355 352	499 556	586 004	648 993	911 582	1 088 745	1 474 937	1 760 062	1 978 009
Ghana	—	—	—	—	—	—	—	—	—	809	16 883	38 915	51 127
Grèce — *Greece* — Grecia	—	—	—	—	—	—	—	—	—	1	8 092	17 335	27 211
Hawaï — *Hawaii* — Hawai	—	—	—	—	—	—	—	—	—	—	—	—	67 000
Hongkong	—	—	—	—	—	—	—	—	—	—	—	—	—
Hongrie (Rép. Pop.) *Hungarian People's Rep.* Hungría (Rep. Pop.)	5 123	5 526	14 773	21 520	47 107	70 263	85 353	104 230	133 635	153 842	—	—	210 489
Inde — *India*	—	—	—	—	—	—	—	—	—	—	1 826	3 959	6 643
Iran	—	—	—	—	—	—	—	—	—	—	2 420	6 304	8 690
Irlande — *Ireland* — Irlanda	—	—	—	—	—	4 587	14 305	30 197	35 223	47 822	39 112	73 614	88 782
Israël (Etat d') *Israel (State of)* Israel (Estado de)	—	—	—	—	—	—	—	—	—	2 025	—	20 354	28 103
Italie — *Italy* — Italia	—	—	—	—	—	68 111	132 467	185 106	267 123	332 817	381 830	759 030	
Japon — *Japan* — Japón	—	—	—	—	—	23 977	59 000	105 764	167 039	260 727	333 106	382 812	
Kenya — Tanganyika — Uganda	—	—	—	—	—	—	—	—	—	—	1 785	3 650	3 923
Liban — *Lebanon* — Líbano	—	—	—	—	—	—	—	—	—	—	—	—	4 704
Luxembourg — *Luxembourg*	—	—	337	12 959	19 387	28 146	40 401	49 358	53 483	52 638	56 266	73 983	81 229
Malaisie (Fédé.) et Singapour *Malaya (Fed.) and Singapore* Malaya (Fed.) y Singapur	—	—	—	—	—	—	—	—	—	—	6 746	16 279	21 218
Mali	—	—	—	—	—	—	—	—	—	—	—	—	858
Malte — *Malta*	—	—	—	—	—	—	—	—	—	—	—	—	1 128
Maroc (Royaume du) *Morocco (Kingdom of)* Marruecos (Reino de)	—	—	—	—	—	19 782	43 242	56 047	72 213	80 230	93 326	97 532	103 986
Norvège — *Norway* — Noruega	38 730	77 946	97 599	113 478	153 667	187 705	221 331	265 207	316 113	360 043	483 396	546 207	582 524
Nouvelle-Zélande *New Zealand* Nueva Zelandia	—	—	—	—	—	—	—	—	—	—	11 586	14 023	20 458
Pakistan	—	—	—	—	—	—	—	—	54	1 172	4 085	5 821	7 671
Panama — *Panama*	—	—	—	—	—	—	—	—	—	—	—	—	—
Pays-Bas — *Netherlands* — Países Bajos	132 580	*254 828*	395 129	493 070	787 170	955 486	1 197 065	1 297 417	1 426 403	1 651 036	1 922 924	2 094 308	2 412 701
Pérou — *Peru* — Perú	—	—	—	—	—	—	—	—	3 836	7 433	—	—	27 076
Philippines (Rép. des) *Philippines (Rep. of the)* Filipinas (Rep. de las)	—	—	—	—	—	—	8 073	8 470	12 609	15 877	21 165	27 867	39 322
Pologne (Rép. Pop. de) *Poland (People's Rep. of)* Polonia (Rep. Pop. de)	—	—	1 620	14 934	22 497	45 909	74 994	111 162	170 466	192 049	252 042	297 493	288 397
Porto-Rico — *Puerto Rico*	—	—	—	—	—	—	1 416	2 778	7 725	11 891	13 437	17 652	20 621
Portugal	—	—	—	—	7 763	9 531	12 817	14 752	23 758	27 004	35 987	49 240	67 714
République Dém. Allemande *German Dem. Rep.* Rep. Dem. Alemana	—	—	23 889 [1]	29 499 [1]	43 521 [1]	62 022 [1]	82 910 [1]	101 671 [1]	141 209 [1]	162 453 [1]	202 290 [1]	164 449 [1]	206 032 [1]
République Fédérale d'Allemagne *Fed. Rep. of Germany* Rep. Fed. de Alemania	173 740	462 115	714 142	1 009 282	1 480 333	1 782 250	2 169 361	2 396 662	2 733 939	3 244 506	3 863 538	4 344 718	4 837 124
Rhodésie et Nyassaland (Fédé.) *Rhodesia and Nyasaland (Fed.)* Rhodesia y Nyasalandia (Fed.)	—	—	—	—	—	—	826	1 446	1 487	3 579	16 389	5 018	35 005
Roumanie (Rép. Pop.) *Roumanian People's Rep.* Rumania (Rep. Pop.)	—	—	—	—	—	—	—	2 808	18 869	51 736	—	—	—
Royaume-Uni de la Grande-Bretagne et de l'Irlande du Nord *United Kingdom of Great Britain and Northern Ireland* Reino Unido de Gran Bretaña e Irlanda del Norte	79 660	173 152	242 749	329 250	661 076	876 015	1 142 420	1 308 740	1 547 435	1 797 914	2 239 621	2 444 457	2 883 643
Rwandaise (Rép.) — Burundi *Rwanda (Rep. of) — Burundi* Ruandesa (Rep.) — Burundi	—	—	—	—	—	—	—	—	—	—	7 700	8 449	3 166
Sénégal (Rép. du) *Senegal (Rep. of the)* Senegal (Rep. del)	—	—	—	—	—	—	—	—	6 509	9 574	16 001	22 476	24 673
Soudan (Rép.) — *Sudan (Rep.)*	—	—	—	—	—	—	—	—	—	—	—	—	3 170
Sudafricaine (Rép.) *South Africa (Rep. of)* Sudafricana (Rep.)	—	—	—	—	—	2 617 [2]	10 012	16 230	17 915	18 726	19 131	24 120	61 669
Suède — *Sweden* — Suecia	63 861	113 651	163 467	220 862	317 547	397 160	488 068	541 640	603 983	685 821	820 135	943 852	1 105 003
Suisse — *Switzerland* — Suiza	70 236	166 865	213 574	297 533	428 576	528 054	671 629	717 986	850 567	1 002 010	1 219 751	1 397 880	1 682 988
Surinam	—	—	—	—	—	—	—	—	—	—	—	—	573
Tchécoslovaque (Rép. Soc.) *Czechoslovak Soc. Rep.* Checoslovaca (Rep. Soc.)	22 856	49 437	46 500	62 231	83 420	126 176	155 052	173 252	189 828	224 083	—	—	—
Tunisie — *Tunisia* — Túnez	—	—	—	—	3 864	12 690	15 447	17 077	28 615	30 854	36 027	43 643	—
URSS — *USSR* — URSS	—	—	—	—	—	—	—	37 232	71 435	118 872	120 750	145 366	190 288
Venezuela	—	—	—	—	—	—	—	—	—	5 784	9 345	12 374	15 144
Yougoslavie — *Yugoslavia* — Yugoslavia	—	—	—	15 798	45 727	53 843	87 936	92 167	113 045	149 930	189 084	204 392	247 640
Total exprimé en pourcentages en comparaison de juillet 1950 *Total, in percentages in relation to July, 1950* Total expresado en porcentajes en comparación con julio de 1950	100%	222%	320%	443%	690%	866%	1 112%	1 267%	1 513%	1 804%	2 173%	2 473%	2 892%

[1] Renseignements émanant de sources extérieures à l'Union. — *Information from sources outside the Union.* — Informes procedentes de fuentes ajenas a la Unión.

[2] Trafic de départ seulement. — *Outgoing only.* — Tráfico de salida, únicamente.

TABLEAU - TABLE - CUADRO III

Tableau comparatif du trafic international télex de départ et d'arrivée (en minutes taxées) pour les années 1946-1962
Comparative table showing outgoing and incoming international telex traffic (in chargeable minutes) for the years 1946-1962
Cuadro comparativo del tráfico internacional télex de 1946 a 1962 de salida y de llegada (en minutos tasados)

N.B. Les tirets dans les colonnes indiquent, soit que le service télex n'existait pas encore, soit que les renseignements font défaut. — *Dashes indicate either that the telex service had not yet come into being, or that information is lacking.* — La raya en una columna indica que todavía no existía el servicio télex o que no se dispone de datos.

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Algérie — *Algeria* — Argelia	—	—	—	—	—	—	—	—	—	18 793	—	—	—	—	—	—	—
Antilles néerlandaises *Netherlands Antilles* Antillas neerlandesas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17 872	19 897
Argentine (Rép.) — *Argentine Rep.* — Argentina (Rep.)	—	—	—	—	—	—	—	—	—	—	—	96 066	211 434	492 268	742 296	1 043 439	1 265 037
Australie (Comm. de l') — *Australia (Commonwealth of)* Australia (Fed. de)	—	—	—	—	—	—	—	—	—	—	—	—	23 197	284 460	233 005 *	326 500 *	378 374 *
Autriche — *Austria*	3 051	31 415	92 228	167 895	171 812	255 425	372 256	673 691	2 398 209	3 256 545	3 856 699	5 047 835	5 592 108	6 868 731	8 057 177	9 032 037	9 909 769
Belgique — *Belgium* — Bélgica	—	—	128 178	228 741	521 860	1 182 287	1 855 964	2 714 827	3 568 617	4 781 401	5 842 717	6 832 772	7 963 491	9 146 851	11 107 237	12 633 287	13 855 940
Bermudes — *Bermuda*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4 007
Brésil — *Brazil* — Brasil	—	—	—	—	—	—	—	—	—	—	—	—	—	259 413	—	—	—
Bulgarie (Rép. Pop. de) *Bulgaria (People's Rep. of)* Bulgaria (Rep. Pop. de)	—	—	—	—	—	—	—	—	—	—	—	—	—	516 723	705 704	868 764	1 019 589
Canada — *Canada*	—	—	—	—	—	—	—	—	—	—	—	150 262	221 363	481 779	483 862	562 375	659 057
Chili — *Chile*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	150 813	—	—
Chine — *China*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7521 (1.IX.60)	40 807	107 593
Colombie (Rép. de) *Colombia (Rep. of)* Colombia (Rep. de)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	63 726	182 743	210 430
Congo (Rép. du) (Brazzaville) *Congo (Rep. of) (Brazzaville)* Congo (Rep. del) (Brazzaville)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15 479	62 320
Congo (Rép. du) (Léopoldville) *Congo (Rep. of) (Leopoldville)* Congo (Rep. del) (Leopoldville)	—	—	—	—	—	—	—	—	40 918	63 849	65 816	60 191	73 847	107 204	—	—	—
Côte d'Ivoire (Rép. de la) *Ivory Coast (Rep. of the)* Costa de Marfil (Rep. de la)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11 772 (15. X. 61)	250 558
Danemark — *Denmark* — Dinamarca	291 000	400 000	672 000	643 000	789 000	1 065 000	1 654 000	2 255 000	3 298 435	4 119 689	4 999 285	5 757 208	6 633 466	7 255 236	8 207 014 *	9 040 387	10 184 996
Espagne — *Spain* — España	—	—	—	—	—	—	—	—	—	86 607	143 878	232 636	254 840	416 971	602 362	569 681 *	1 424 368
Etats-Unis d'Amérique *United States of America* Estados Unid. de América	—	—	—	—	16 671	121 207	237 627	419 764	504 151	803 460	?	?	2 356 918	3 624 284	2 235 232 *	6 469 372	7 923 315
Finlande — *Finland* — Finlandia	24 136	78 516	109 573	123 648	167 402	225 317	370 824	468 948	673 870	937 385	1 253 445	1 336 429	1 590 957	1 958 128	2 419 672	3 008 140	1 619 333*
France — *France*	23 535	122 745	192 655	334 846	702 447	1 214 436	1 903 521	2 338 389	3 537 971	4 880 512	5 954 894	6 876 689	8 413 947	10 769 290	7 589 418 *	9 356 286 *	10 505 710*
Ghana	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17 852 (1. XI. 62)
Grèce — *Greece* — Grecia	—	—	—	—	—	—	—	—	—	—	—	—	2 609	99 433	336 379	552 522	740 500
Hawaï — *Hawaii* — Hawai	—	—	—	—	—	—	—	—	—	—	—	—	67 000	75 365	48 909 *	108 614	183 772
Hongkong	—	—	—	—	—	—	—	—	—	—	—	—	—	40 389	82 475 *	209 206	385 647
Hongrie (Rép. Pop.) *Hungarian Peopl. Rep.* Hungría (Rep. Pop.)	—	—	—	—	—	—	—	—	—	905 213	1 085 437	1 251 488	1 379 568	1 883 172	—	—	1 320 089*
Inde — *India*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8 453 (1.VI.60)	24 733	62 247
Iran — *Iran*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11 310 (III. 60)	57 117	81 626
Irlande — *Ireland* — Irlanda	—	—	—	—	—	—	—	—	—	983	105 085	204 717	469 614*	721 868*	318 023 *	401 828 *	443 041*
Israël (Etat d') *Israel (State of)* Israel (Estado de)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	218 528	271 047
Italie — *Italy* — Italia	—	—	—	—	—	—	—	—	—	—	—	260 740	1 300 216	1 737 461	2 679 893	3 460 807	4 165 497	5 925 135
Japon — *Japan* — Japón	—	—	—	—	—	—	—	—	—	—	—	65 334	471 381	926 815	1 662 514	2 621 110	3 722 148	4 300 440
Kenya — Tanganyika — Uganda	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7 386 (8. XI. 60)	27 724	47 378
Luxembourg — *Luxembourg*	—	—	—	—	—	—	—	—	1 938	56 330	245 869	318 332	403 424	468 412	590 105	647 329	635 919	747 016	891 121	1 002 600
Malaisie (Fédé.) et Singapour — *Malaya (Fed.) and Singapore* — Malaya (Fed.) y Singapur	—	—	—	—	—	—	—	—	—	—	—	—	—	38 392	144 854	210 460	260 426
Mali	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 025* (1. VI. 62)
Malte — *Malta*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3 436
Maroc (Royaume du) *Morocco (Kingdom of)* Marruecos (Reino de)	—	—	—	—	—	—	—	—	—	141 634	380 208	503 449	720 574	821 633	549 058 *	674 749 *	1 112 383
Nigeria	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Norvège — *Norway* — Noruega	31 092	52 605	90 227	141 935	207 038	315 252	441 526	540 926	1 493 736	1 897 647	2 255 999	2 489 715	3 257 316	3 905 937	2 159 779 *	5 733 614	6 215 372
Nouvelle-Zélande *New Zealand* Nueva Zelandia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14 789* (1. IX. 60)	157 367	222 940
Pakistan — *Pakistan*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	32 800	64 448	88 102
Panama — *Panama*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12 410	19 396
Pays-Bas — *Netherlands* — Países Bajos	37 899	299 320	451 665	788 592	1 471 815	2 402 976	3 831 021	5 564 472	8 000 031	10 516 642	12 374 510	14 027 290	15 545 627	18 431 778	20 400 000 *	22 154 405 *	24 900 521 *
Philippines (Rép. des) *Philippines (Rep. of the)* Filipinas (Rep. de las)	—	—	—	—	—	—	—	—	—	—	—	—	112 222	169 430	—	—	—
Pologne (Rép. Pop. de) *Poland (People's Rep. of)* Polonia (Rep. Pop. de)	—	—	—	—	—	—	—	104 232	269 487	420 246	675 924	1 132 106	1 768 754	2 329 733	2 748 448	3 213 330	3 903 481
Porto-Rico — *Puerto Rico*	—	—	—	—	—	—	—	—	—	—	—	—	43 391	119 679	76 342 *	167 729	221 024
Portugal	—	—	—	—	—	—	—	—	—	55 150	103 974	143 987	157 465	218 269	311 656	350 789	463 225	259 162*
Rép. Dém. Allemande * *German Dem. Rep.* * Rep. Dem. Alemana *	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
République Fédérale d'Allemagne *Fed. Rep. of Germany* Rep. Fed. de Alemania	—	—	—	—	—	321 419	1 925 851	3 961 196	6 762 038	10 558 412	15 053 613	19 577 226	22 551 922	26 119 005	29 402 896	36 482 175	42 139 854	46 564 006	50 410 333
Rhodésie et Nyassaland (Fédé.) *Rhodesia and Nyasaland (Fed.)* Rhodesia y Nyasalandia (Fed.)	—	—	—	—	—	—	—	—	—	—	—	—	5 512	11 104 *	16 177	21 136	193 777	43 074 *	343 586
Roumanie (Rép. Pop.) *Roumanian Peopl. Rep.* Rumania (Rep. Pop.)	—	—	—	—	—	—	—	—	—	—	—	—	—	597 400	—	—	—	—	—
Royaume-Uni de la Grande-Bretagne et l'Irlande du Nord *United Kingdom of Great Britain and Northern Ireland* Reino Unido de Gran Bretaña e Irlanda del Norte	—	100 883	295 055	539 987	937 340	1 448 455	2 290 184	3 326 039	3 606 818	8 564 887	10 997 594	12 523 598	13 671 113	19 206 036	21 463 088 *	13 063 270 *	27 984 414 *
Rwandaise (Rép.) — Burundi *Rwanda (Rep. of) — Burundi* Ruandesa (Rep.) — Burundi	—	—	—	—	—	—	—	—	—	—	—	—	—	—	32 180 (1. VI. 62)	73 608	—
Sénégal (Rép. du) *Senegal (Rep. of the)* Senegal (Rep. del)	—	—	—	—	—	—	—	—	—	—	—	—	41 870	126 754	151 679	190 890	230 759
Soudan (Rép.) — *Sudan (Rep.)*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11 878 (1. VII. 62)
Sudafricaine (Rép.) *South Africa (Rep. of)* Sudafricana (Rep.)	—	—	—	—	—	—	—	—	—	—	—	104 455	163 152	223 184	240 280	141 044 *	339 290	396 972
Suède — *Sweden* — Suecia	342 626	418 417	536 413	555 538	603 933	963 818	1 520 462	2 236 851	3 245 440	4 281 084	5 245 207	5 910 417	6 623 063	7 818 635	4 355 435 *	4 704 843 *	6 060 042*
Suisse — *Switzerland* — Suiza	73 617	223 042	271 334	428 655	583 966	1 559 842	2 234 501	3 206 660	4 436 864	5 873 222	6 944 902	8 199 092	9 482 946	11 375 713	13 327 857 *	15 458 846 *	17 422 853 *
Surinam	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4 201
Tchécoslovaque (Rép. Soc.) *Czechoslovak Soc. Rep.* Checoslovaca (Rep. Soc.)	13 174	68 075	242 427	280 356	347 789	523 806	579 287	671 375	954 380	1 296 779	1 719 588	2 017 136	—	—	—	—	—
Tunisie — *Tunisia* — Túnez	—	—	—	—	—	—	—	—	—	64 059	142 170	169 191	325 086	405 202	384 605	457 826	—
URSS — *USSR* — URSS	—	—	—	—	—	—	—	—	—	—	—	—	796 047	1 287 453	900 671 *	1 099 900 *	1 582 055*
Venezuela	—	—	—	—	—	—	—	—	—	—	—	—	—	39 371	92 845	127 645	156 987
Yougoslavie — *Yugoslavia* — Yugoslavia	—	—	—	—	—	—	—	—	308 852	660 680	874 817	1 204 423	1 388 757	1 663 371	2 223 630	2 619 528	2 714 313

* Trafic de départ seulement — *Outgoing only* — Tráfico de salida únicamente.

[1] Non compris le trafic d'arrivée du Royaume-Uni — *Excluding incoming traffic from the United Kingdom* — No incluido el tráfico de llegada del Reino Unido.

[2] Renseignements émanant de sources extérieures à l'Union — *Information from sources outside the Union* — Informes procedentes de fuentes ajenas a la Unión.

* Nombre approximatif, le trafic d'arrivée n'étant pas encore entièrement connu. — *Approximate number, since full details of the incoming traffic are not yet available* — Número aproximado, por no conocerse todavía totalmente el tráfico de llegada.

[1] Non compris le trafic originaire et à destination de la République Sudafricaine — *Does not include traffic to and from the Republic of South Africa* — No comprendido el tráfico originario y destinado a la República Sudafricana.

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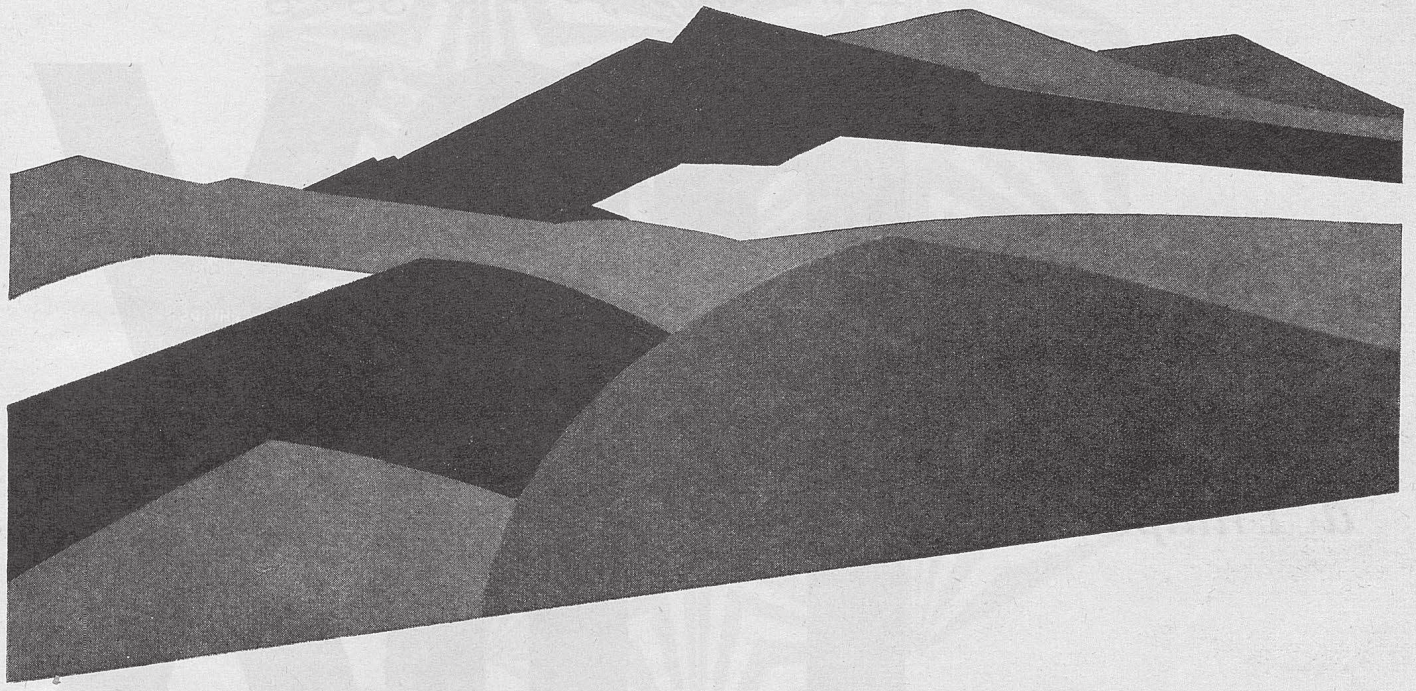
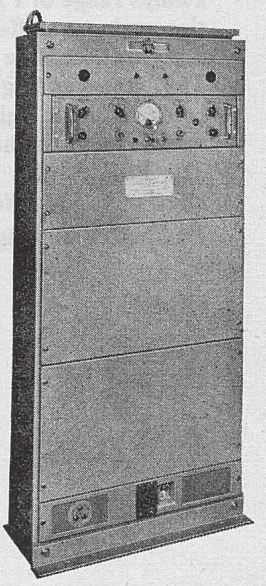
Improved 'Rural Radio' for versatile Cross-Country Communications



Type 800 UHF/VHF Radio Telephone Systems

The Type 800 single channel radio telephone system is an improved version of the well-known AT&E 'Rural Radio' and offers substantial economies both in installation and maintenance costs wherever the terrain prohibits the use of cables or overhead lines. The equipment is completely compatible with the existing range of AT&E telephone equipments, and signalling and relay sets are available which permit suitable termination of virtually any type of telephone, exchange or switchboard.
The equipment is contained in a single terminal rack and operates in the UHF and VHF bands with a maximum frequency of 500 Mc/s. The power output ranges from 6 watts to 150 watts according to requirements. The equipment is narrow band apparatus and high stability performance permits operation on adjacent channels spaced only 25 kc/s apart. Normally the use of aerial diplexers permits single aerial operation.
The Type 800 equipment is just one of a wide range of communication equipments built by AT&E, who also offer a comprehensive planning, surveying and installation service.
If you would like more details, please write to:



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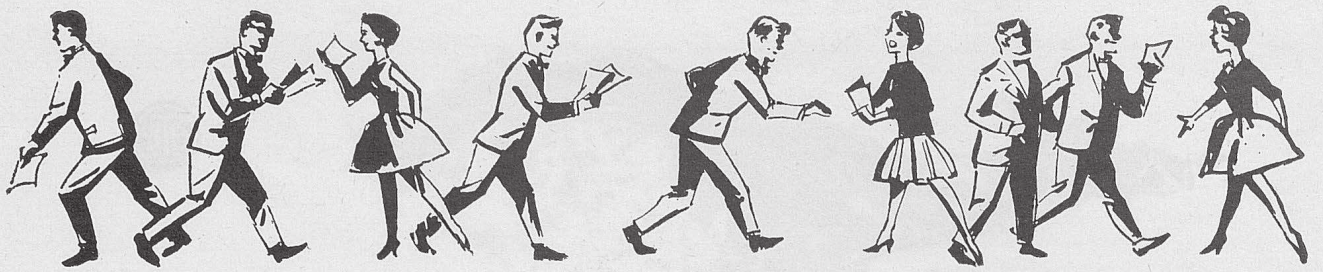

1738-E

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PAX

Private **A**utomatic **X**-change

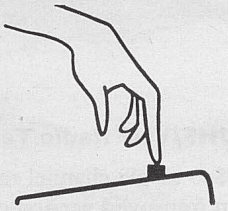
Invest in a Philips

It is astonishing how much time and money can be saved by installing a private automatic exchange. It cuts out the continual chasing about with notes and memos and eliminates the endless processions to and from conferences. No exchange does so more effectively than the Philips range of PAX's, which also offer a large choice of extra facilities such as staff-location devices and conference circuits, specially designed to ensure maximum operating efficiency.

The free-standing PHILIPS UP exchange in standard office-type cabinets has a minimum capacity of approx. 50 extensions and is expandable to a maximum capacity of 450 extensions.

The PHILIPS UB rack-mounted exchange has unlimited capacity starting at 200 extensions, plus a wide range of facilities.

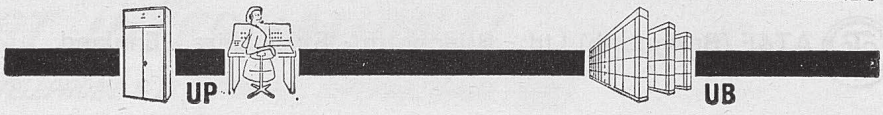
Pushbutton dialling is possible with both types.



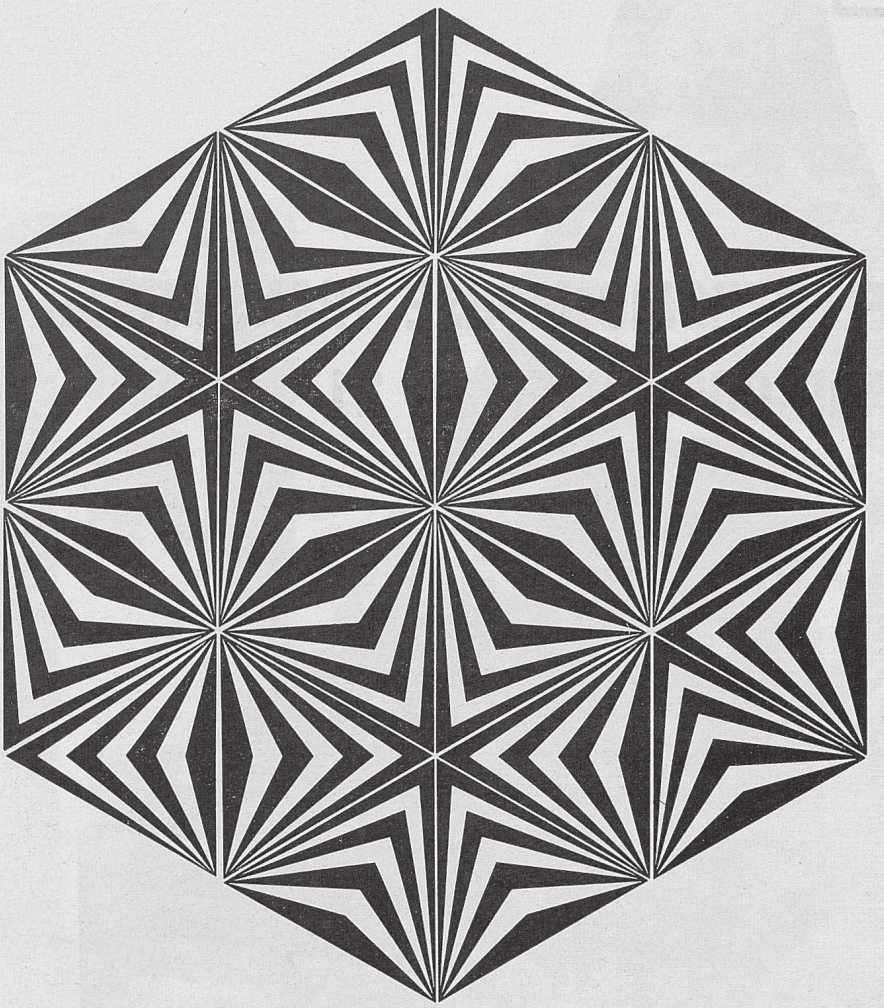
The greatest possible efficiency in telephone operation is achieved with Philips unique push-button dialling system. This enables connections to be set up much faster than with rotary dials.

PHILIPS

N.V. PHILIPS' TELECOMMUNICATIE INDUSTRIE HILVERSUM THE NETHERLANDS



an advertisement in Philips KEY CAPITALS series



Olivetti Teleprinters

Teleprinters operating in accord with CCITT standards - International 5-unit N. 2 alphabet; signals of 7,5 impulses - Telegraphic speed of 45,5, 50 or 75 Bauds.
Send-receive or receive only teleprinters, page and tape models.
Send-receive or receive-only printing reperforators.
Keyboard perforators, with or without page copy available.

Tape reperforating and automatic tape transmitting attachments.
Single and multiple automatic tape transmitters.
Line units and control boxes.
V.F. signal converters operated on frequency shift basis.
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San Lorenzo Factory
Telephone: 36.72
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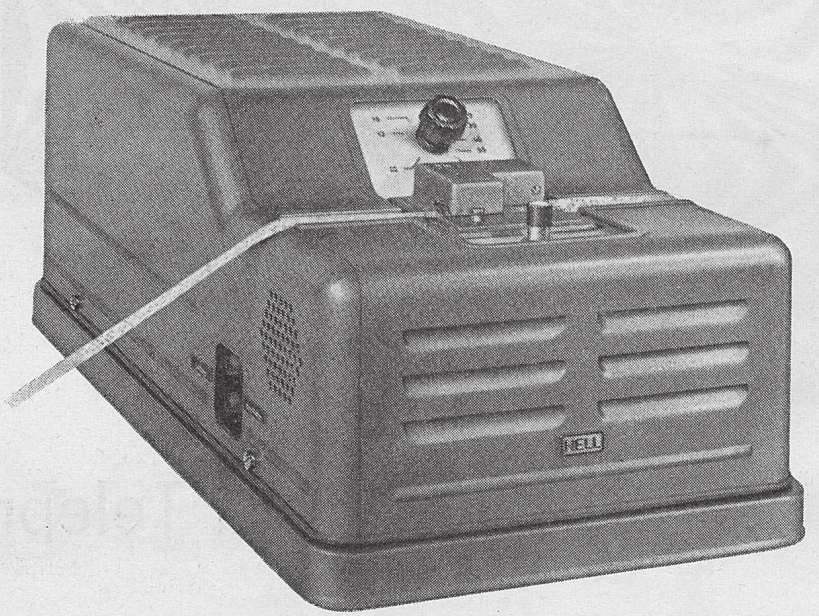
HELL

ELECTRONIC MORSE TRANSMITTER AND CONVERTER EG 21



For Conversion of Standard 5-unit code tape into Wheatstone code morse signals. The input tape change-over signals for letters, figures, carriage return, line feed etc. are evaluated by a stop-motion device and allowed for so as to ensure continuous transmission of morse signals. Speed of transmission is continuously adjustable between 10 and 65 wpm. Output is by tone frequency or key relay. The equipment is of modern, fully transistorized design and incorporates a 1000 cps oscillator.

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TELEPHONE CABLES LIMITED concentrate their immense resources on the economical manufacture and application of telecommunication cable. The design, manufacture and installation of cables are their speciality—from countrywide telephone and telegraph systems to sound and television broadcast networks and control systems. TCL are ready to give immediate advice on the appropriate cable for every application—type, size and insulation. The standard range is very wide, but if necessary TCL can provide early delivery of cables designed and built to special requirements.
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THE ORGANISATION WITH 125 YEARS' EXPERIENCE

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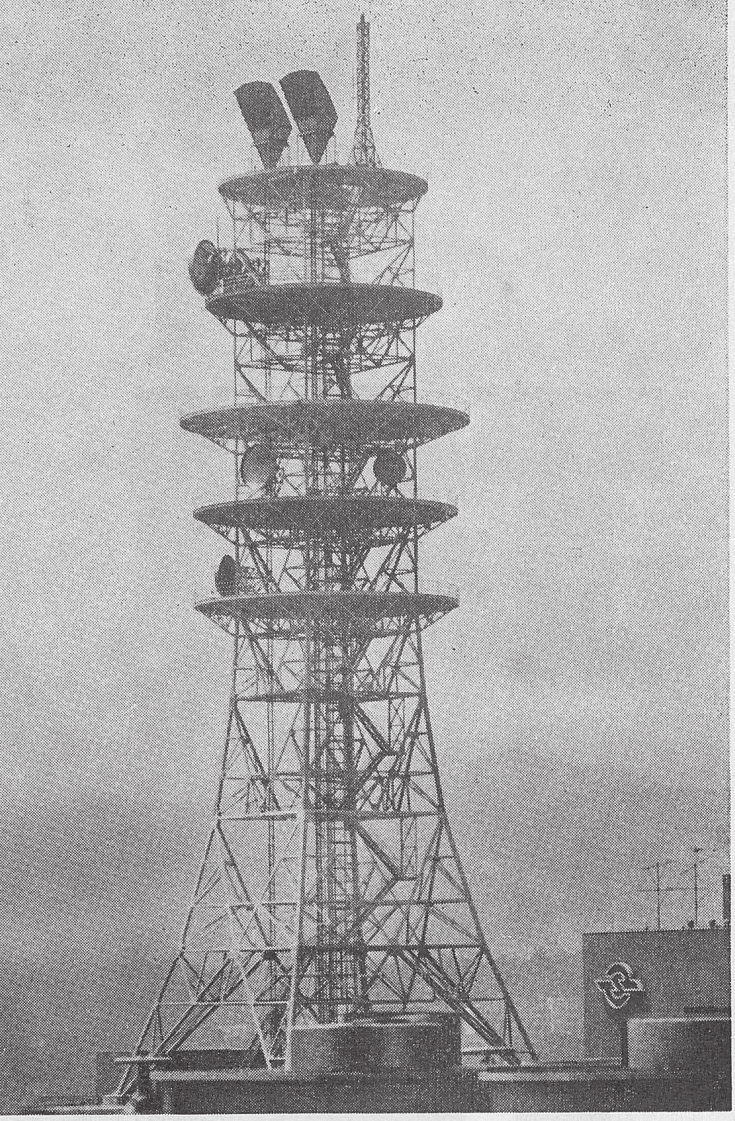
MITSUBISHI MICROWAVE ANTENNAS FOR TELECOMMUNICATIONS



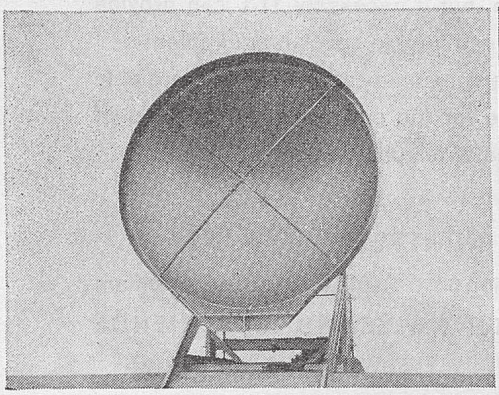
Japan today has the second largest microwave network in the world. Mitsubishi Electric, with the longest microwave antenna experience in Japan, has supplied 90% of the antennas used in the trunk lines of this extensive network. Mitsubishi antenna systems include parabolic, scatter, horn reflector and radar types, as well as a complete line of waveguide components and accessories. Frequencies from 900 Mc. to 24 KMc. are covered. The IU-62, shown above and specified at the right, is typical of the outstanding performance of Mitsubishi microwave antennas. Full technical information on any of these types of antennas is available at your request.

IU-62 Horn Reflector Antenna

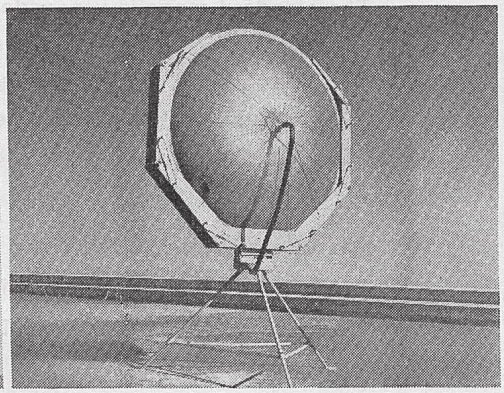
Frequency Range	3,000-12,000 MC
Aperture	9m²
Max. width	4,050mm
Max. depth	2,560mm
Max. height	7,418mm
Gain at 3,900MC	V 41.5 db H 41.2 db
Gain at 6,100MC	V 44.9 db H 45.0 db
VSWR	1.01
Front/Back (over 60 degrees)	67-70 db
Discrimination of cross polarization	V 57 db H 78 db (at 3,900MC) V 45 db H 37.5 db (at 6,100MC)
Guaranteed wind velocity	140 miles/hr

MITSUBISHI ELECTRIC CORPORATION

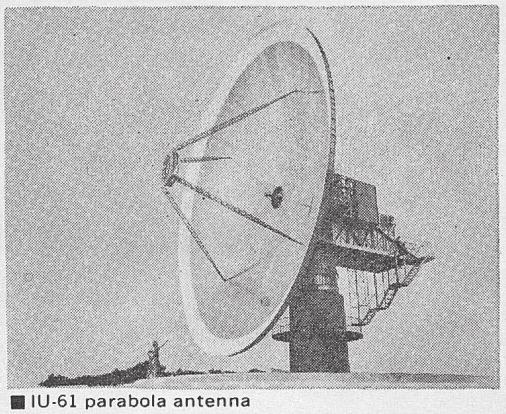
Head Office: Mitsubishi Denki Bldg., Marunouchi, Tokyo. Cable Address: MELCO TOKYO



■ 20 meter diameter antenna for satellite communication



■ Air inflated parabolic antenna



■ IU-61 parabola antenna

MICROPHONES

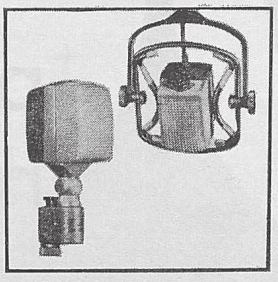
work best, because built best!

Every AKG-Microphone is hand-fabricated and -assembled under white-room conditions with continuous quality control. Each is numbered and response-tested, with a permanent factory record of its performance.
One vital and unique characteristic of all AKG cardioids is that their directional characteristic holds deep into the bass — where it's needed most for crisp recording.

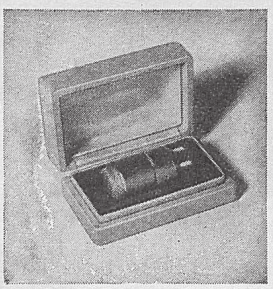
Below is a representative selection of AKG products. In addition to many more microphones of every type, there is a full range of accessories such as windscreens, table and floor stands, power supplies, transformers, and remote-control units.

D 12 — for public address work. The only true music mike that does not develop feedback from loudspeakers at sufficient levels.

D 19 E — high performance, economical for pick-up, announce, and semi-pro tape. Bass-cut switch.



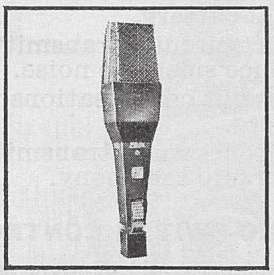
D 20 B left. **D 25 B** right — two mountings of quality wide-range studio mike with bass-cut switch.



D 58 — close-talking announce/-intercom mike, dust proofed. For noise environments. See K 58.

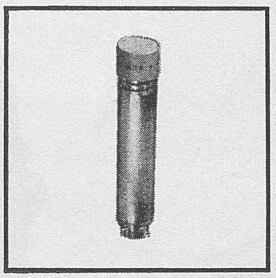
D 24 B — studio-quality voice and music recording, bass-cut switch, anti-magnetic shielding.

D 110 C — compact, rugged low-noise ; for use in hand, lapel, lavalier. Radio. TV, stage, film, and pro tape recording. Excellent under high humidity and extremes of temperature. Available mid-1963.



C 12 A — new modern styled studio condenser microphone, for the most exacting professional recordings.

K 50 — dynamic headphones. Perfect bass without earmuffs ; light, cool, comfortable for extended monitoring. Wide frequency and dynamic ranges, high sensitivity. Convertible mono/stereo.



C 60 — high-performance miniature, interchangeable omni and cardioid capsules. Rechargeable battery-pack as table stand ; neck-strap for use in the field ; transistorized DC-Converter.

K 58 Boom Set — DK 58 mike and K 50 phones for use in language labs, intercom, announcing, control, field-remotes. For close talking. Light, rugged, comfortable, clean sound, for extended use.

MODEL	RANGE cps	SENSITIVITY mV/μbar	CARDIOID DISCRIM db/1000 cps/180°	IMPEDANCE ohms	DIMENSIONS	RETAIL PRICE in G.B. £
Dynamic Microphones						
D 12	40 — 15 000	0.22/2.0 *	18	200/15 000	5 5/8 × 2 1/8 × 2 7/8	34.—.—
D 17	50 — 14 000	0.25	18	200	4 1/16 × 1 3/4	30.—.—
D 19 C	40 — 16 000	0.18	15	200	6 × 1 7/16	17.10.—
D 19 E (2)	40 — 16 000	0.18/2.5 *	15	50/200/50 000	7 1/2 × 1 7/16	
D 20 B	30 — 16 000	0.22	20 — 25	200	7 5/16 × 2 1/8 × 2 7/8	61.—.—
D 24 B	30 — 16 000	0.18	20	200	6 1/8 × 1 9/16	60.10.—
D 25 B	same specifications as D 20 B, shock-mounted for boom use					67.—.—
D 58	70 — 12 000	0.1	(1)	200	2 × 3/4	11.10.—
Condenser Microphones						
C 12 A	20 — 20 000	0.5	20	50/200	3 1/8 × 1 5/8 × 1 3/16	please enquire
C 24	same specifications as C 12, two units stacked for stereo					230.—.— **
C 28/29/30 A	30 — 18 000	1.0 — 1.3 *	20	50/200	6 7/8 × 1	130.10.— ***
C 60	30 — 18 000	1.3	20	50/200/500	3 15/16 × 3/4	92.10.— **
Headphones						
K 50	20 — 25 000	0.156 m W/95 phon	(Stereo)	per unit 400	3 oz.	7.10.—
K 58	Boom Set : see D 58 and K 50 for specifications				5 oz.	13.10.—

(1) — close-talking only ; noise cancelling means
(2) — with 5-pole Cannon-XLR-Connector
* — Values are for high and low impedances respectively
** — Price includes all necessary cables, power supply, etc.
*** — Complete Set : individual units priced somewhat lower

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G.m.b.H., Wien 15., Nobilegasse 50, Austria
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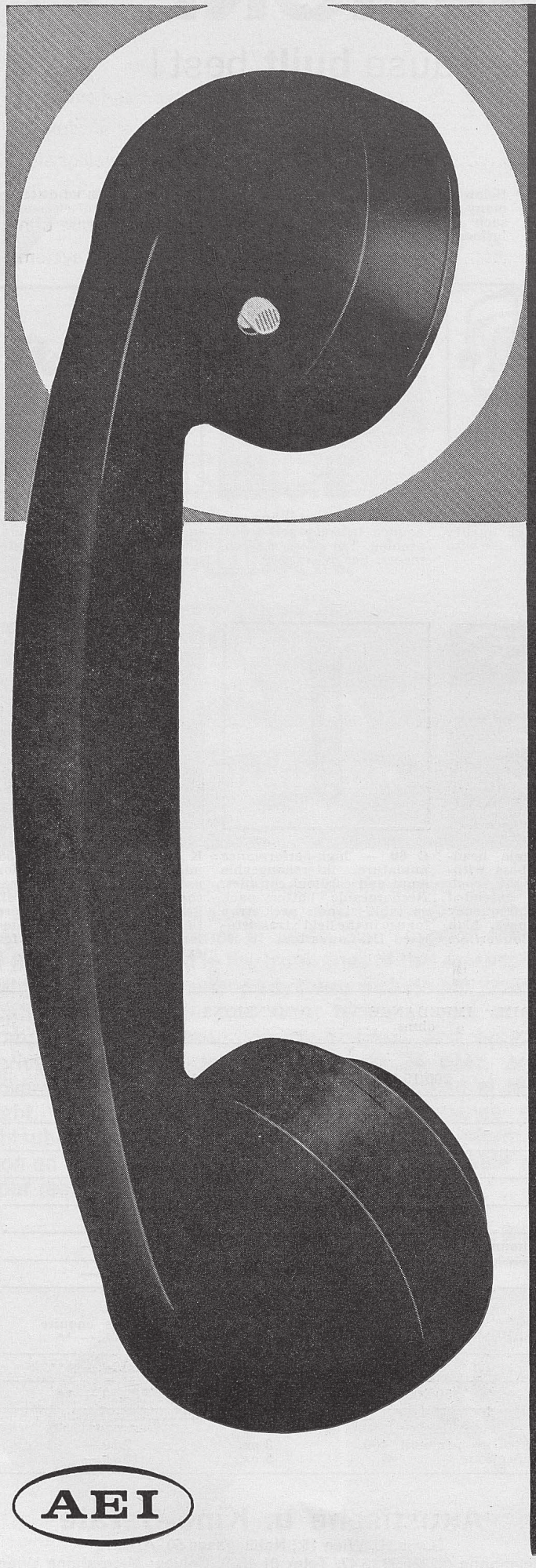


new lightweight

B.P.O. APPROVED

push-button handset

TYPICAL USES

*Provides a convenient means of switching on and off to conserve power from local battery.
*Short-circuits transmitter to reduce side tone noise.
*Cuts out conversations when making asides.
*Switches radio transmitter when used for radio telephony.

MICRO-SWITCH CONTROL

A fast-acting changeover speed of 5 milliseconds makes the provision of a make-before-break action unnecessary, since holding relays of automatic exchanges will not release in so short a time. The switch action is easily changed from locking to non-locking.

RECEIVER

High-efficiency electro-dynamic as standard.

OPTIONAL TRANSMITTERS

STANDARD—two carbon electrodes, or HIGH-OUTPUT LOW-DISTORTION—three carbon electrodes, or HIGH EFFICIENCY—electro dynamic.

LIGHT, DURABLE, ATTRACTIVE

Moulded in impact-resistant co-polymer—highly finished in black, light ivory or elephant grey. Basic weight with cord, only 362 gm (12¾ oz).
Made by AEI—specialists for many years in press-key handsets—this versatile instrument meets the need for modern styled handset with push-button facilities. It has been adopted by the British Post Office. A range of five types has been standardised.

Please write for fully descriptive leaflet PD.7/510B

AEI

Associated Electrical Industries Limited
Telephone Apparatus Department
Telecommunications Division
Woolwich London SE18
Woolwich 2020 Ext. 326

ROME WAS NOT BUILT IN A DAY...

... nor can electronic switching systems be developed overnight. But G.E.C. development is continuous. At Telephone Works a co-ordinated development programme is progressing rapidly with electronic exchange designers building on the firm foundation laid over many years by the designers of the present most modern step-by-step system. G.E.C. electronic exchanges will provide more extensive and flexible facilities than have previously been possible, while taking advantage of the inherent reliability of electronic components. Electronic switching techniques cannot be overlooked in the present planning of future exchange systems.

EVERYTHING FOR TELECOMMUNICATIONS

G.E.C.

Exchange Division

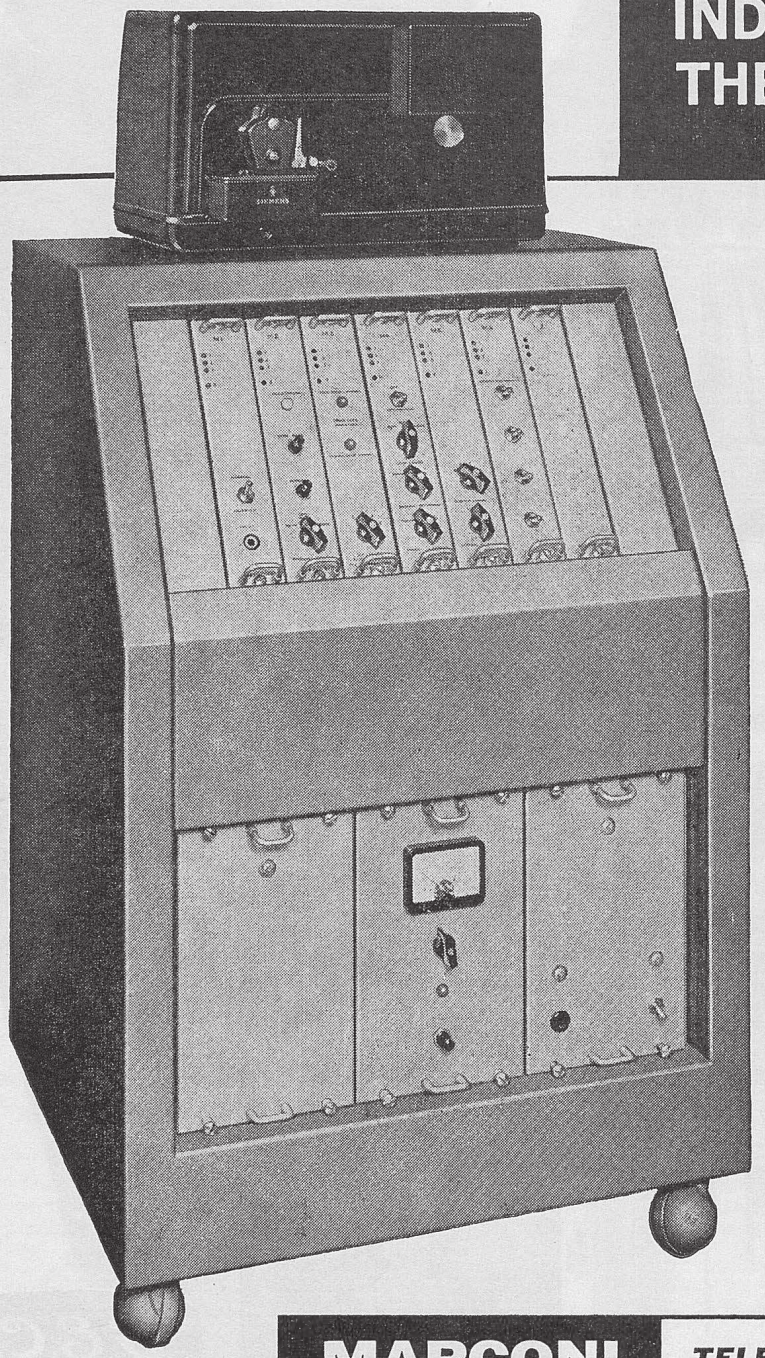
G.E.C. (TELECOMMUNICATIONS) LIMITED · TELEPHONE WORKS · COVENTRY · ENGLAND

Works at Coventry · Middlesbrough and Treforest

Smee's 151

THE MARCONI HU126

SELF CONTAINED 7-UNIT MONITOR PROVIDES MONITORING OF ARQ AGGREGATE SIGNALS* INDEPENDENTLY OF THE ARQ TERMINAL



- Automatic phasing
- Self-synchronizing
- Printed record of any channel or any sub-channel.

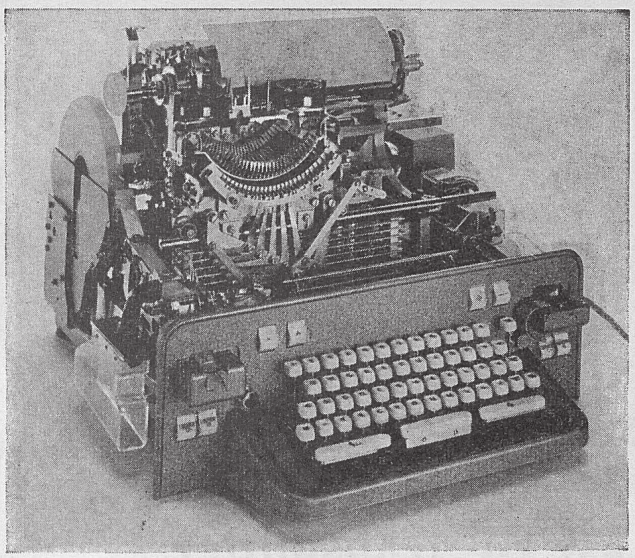
The HU126, an item in the Marconi AUTOPLEX range of error correcting multiplex telegraph equipment, is Ferritransistorized and uses modular construction. Being a self-contained unit with its own power supplies and crystal oscillator, it can be used with any type of ARQ equipment* and quite independently of the ARQ terminals.

* in accordance with CCIR Recommendation No. 242 and/or Report No. 108 (Los Angeles 1959)

MARCONI *TELECOMMUNICATIONS SYSTEMS*

COMMUNICATIONS DIVISION THE MARCONI COMPANY LIMITED. CHELMSFORD. ESSEX. ENGLAND

H11



Lorenz Teleprinter LO 15 C

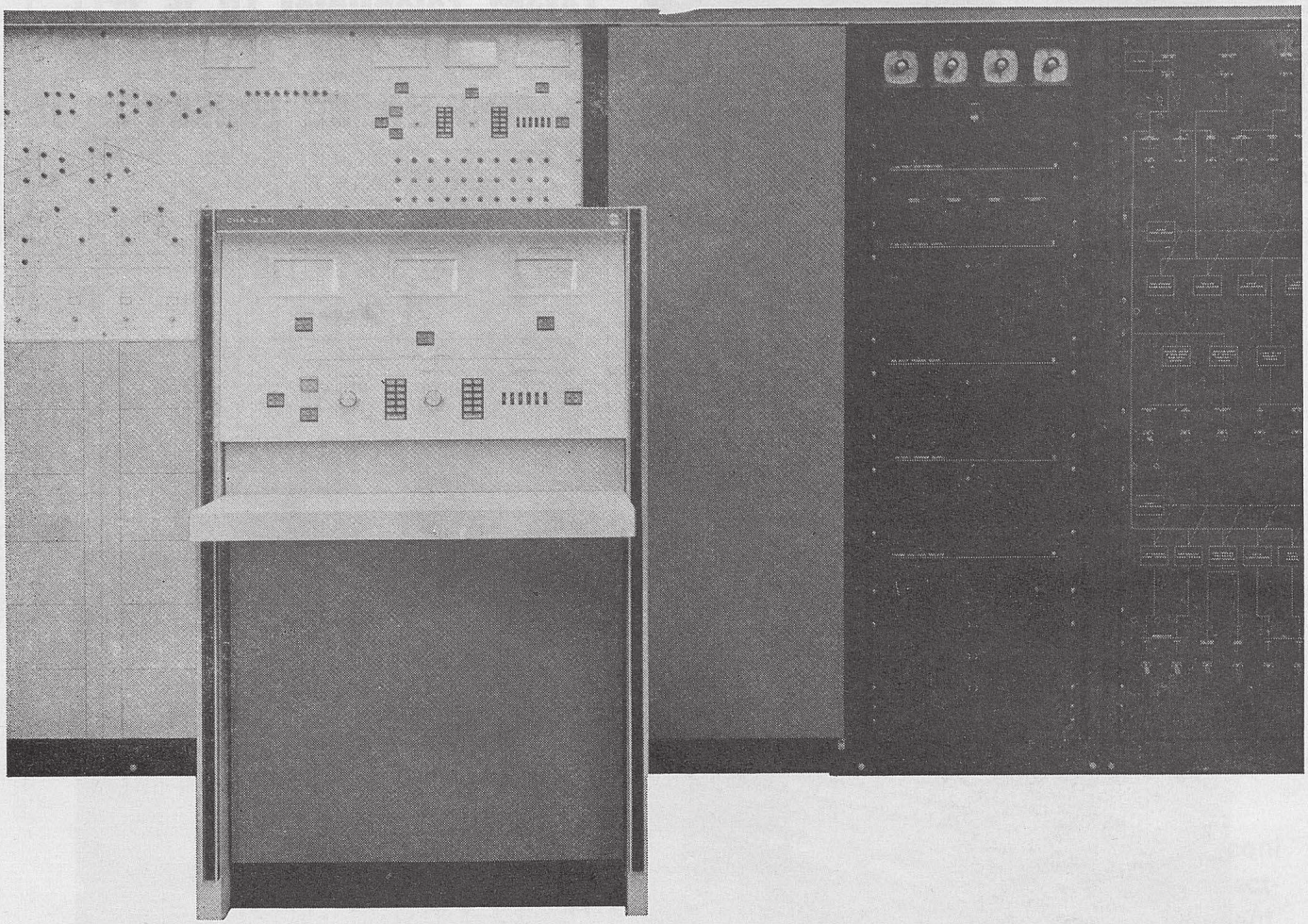
TÉLÉIMPRIMEUR LORENZ LO 15 C

The Lorenz Page Printer features every progress made in the field of teleprinter engineering. A smooth ribbon feeding and the moving type bar carriage permit easy reading on the local record copy of incoming and outgoing messages. Reperforator and tape transmitter attachments allow operation with the internationally admitted print-out rates and, thus, maximum exploitation of the teleprinter.

Le téléimprimeur en page Lorenz est doté de tous les perfectionnements offerts par les derniers progrès de la technique des téléimprimeurs. Grâce au ruban non scintillant et au chariot mobile, il permet la lecture aisée des messages d'arrivée et de départ. Des équipements à bande perforée, à incorporer dans la machine, assurent le rendement maximum du téléimprimeur par la transmission et la réception des messages à des vitesses maximums admissibles sur les réseaux télex.

SEL STANDARD ELEKTRIK LORENZ

ASSOCIÉE À L' ITT



specify THE MODERN 250 kw HF transmitter

it's Collins CHA-250

offering features never before available in high power transmitters.

20-second tuning — Change frequencies in the 3.95 to 26.5 MC range in less than 20 seconds. The operator simply pushes a button to retune and start up on another pre-set frequency.

Contact elimination — Sliding, rolling and switching contacts in the Power Amplifier r-f circuits have been eliminated for increased reliability.

Remote operation — A control console permits operation of the transmitter from a remote location.

Flexible installation — The transmitter can be installed in a variety of configurations in only 800 sq. ft. of floor space. If desired, Collins will provide a complete installation service.

These are just a few of the outstanding features in Collins new 250 kw, HF transmitter. There are more. For complete information, call or write today.

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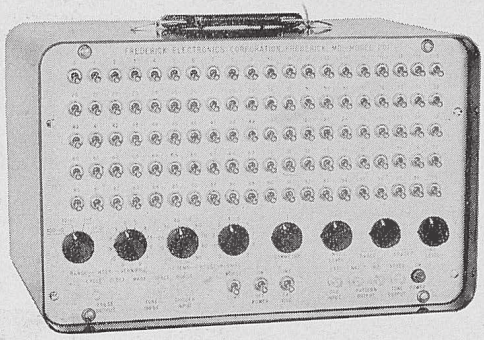
COLLINS

TELECOMMUNICATION EQUIPMENT BY FREDERICK ELECTRONICS CORPORATION

A communications electronics company experienced in the design, development and manufacture of data transmission and telegraph equipment.

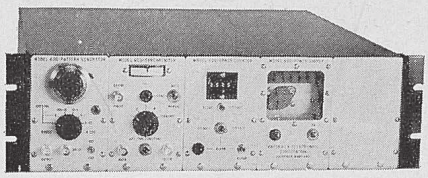


PULSE PATTERN GENERATOR

Simulates Virtually Any Digital Data Signal

MODEL 201

- Generates any length of pulse patterns, 1 to 100 with any combination on and off — over 2^{100} possible pulse patterns.
- Three different forms of output patterns — NRZ, RZ, and audio tone transmission gates for generation of keyed tone and two-tone patterns.
- Continuous variable pulse spacing from 100 milliseconds to 10 microseconds or from an external drive.
- Continuously recycles or triggers in bursts of single patterns on external command.
- Provides bit and frame synchronizing pulses.
- Solid state construction.

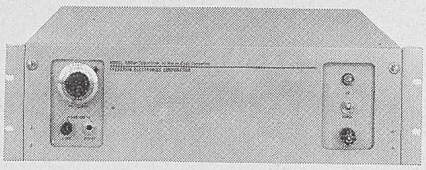


DATA TRANSMISSION TEST SET

for
Wire Line, Radio and Recorded Systems

MODEL 600

- Generates pseudo-random test pattern signal, 2047 bits long at 10-100,000 bits per second from internal oscillator or external clock at sending terminal.
- Unit is slaved to time base of system under test.
- Receives output test pattern — synchronizes and compares it with locally generated "perfect" pattern counts and registers errors on front panel indicator or auxiliary printing totalizer.
- Solid state design with modular construction.
- Pattern generator and power supply are available separately for only pattern generation.
- Interface adapters available for matching to various systems.

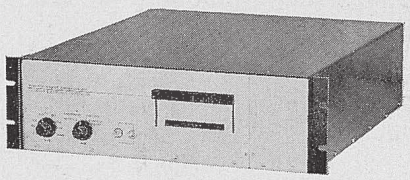


TELEPRINTER-TO-MORSE CODE CONVERTER

for
Simplified Morse Code Operation

MODEL 660A

- Permits advantages of standard teleprinter operation when handling Morse traffic.
- Tapes readily edited prior to final transmission.
- Transmission copy automatically produced.
- Step control with teletypewriter tape reader permits exact Morse spacing.
- Also converts 5 level typewriter code, to any other binary code (Morse 7 and 8 level teletypewriter, error correcting codes, etc.)
- Output code can be up to 23 bits long per character at any bit rate.
- Keyed sidetone permits audio monitoring of output signal.



TELEGRAPH MESSAGE GENERATOR

Replaces Most Tape and "Canned" Message Transmitters

MODEL 400

- Start-stop operation with 90 character 5-level code.
- Synchronous operation with 540 bit pattern.
- Message read from a standard accounting machine card.
- Operates at most commonly used telegraph speeds.
- Speeds to 1200 and 2400 baud can be supplied.
- Interface adapters available for matching to various systems.
- No moving parts during readout.
- Solid state; standard relay rack.
- Modularized for quick-easy maintenance.
- Power required: 115 volts ac, 50-60 cycles 30 watts, single phase.

FEC

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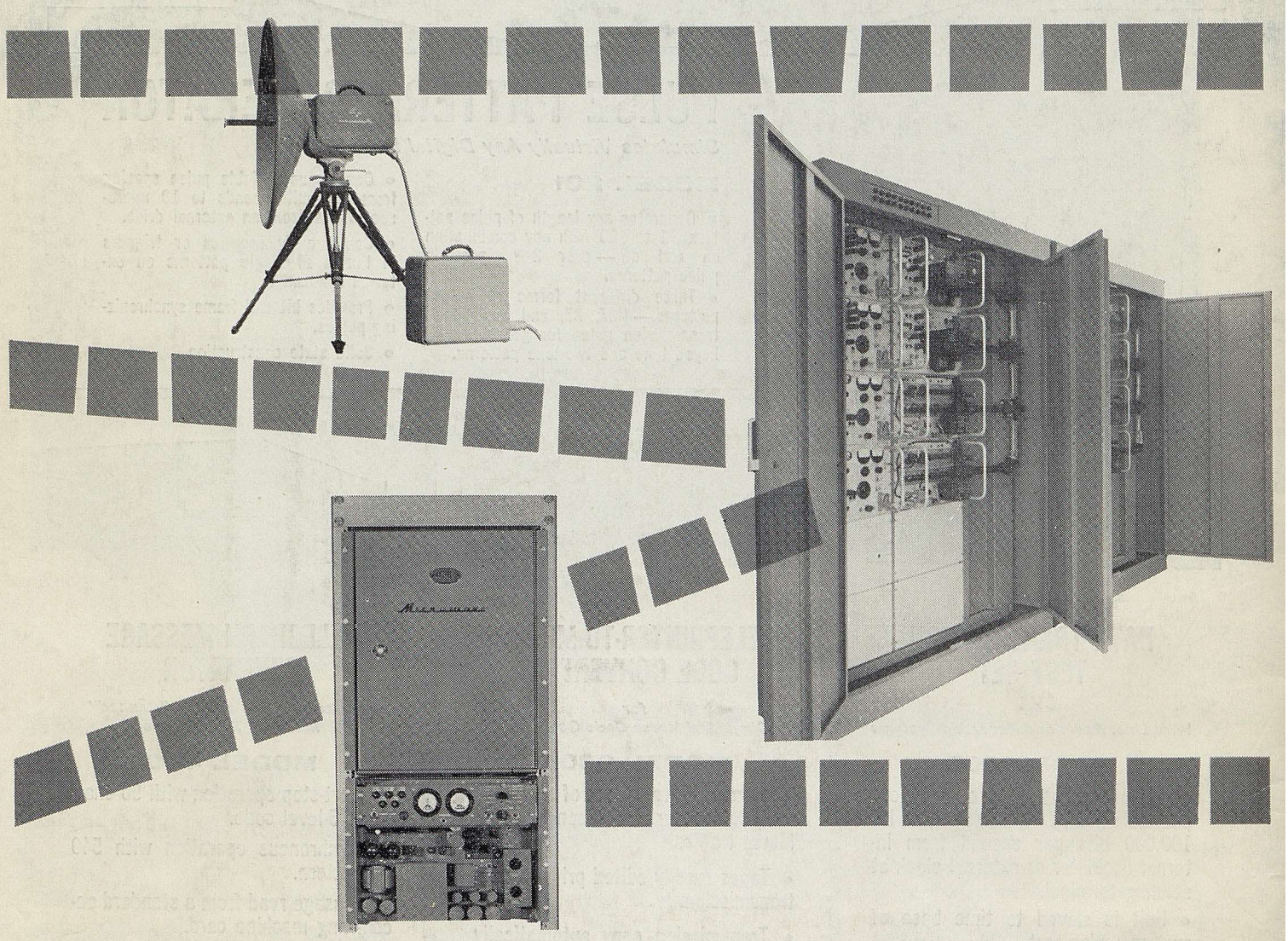
Frederick, Maryland U.S.A. **Cable Address FREDCO — Frederick, Maryland**

5925-8200 MHz
10,700-12,700 MHz

KTR-1000 SERIES



PORTABLE, RACK, CABINET

AVAILABLE NOW with the experience of over 1500 installations throughout the world SELENIA, in association with the Raytheon Company, announces the availability of portable and fixed equipment for permanent and emergency use, transmitting 960 voice channels or one television channel. Utilizing a full 10MHz baseband, the new KTR series meets in full all CCIR recommendations for 300 voice channels or one color TV channel including sound on vision.Inputs and outputs at if and video are standard. A complete line of accessory equipment is available.

Write for complete brochures describing antennas, remote control and alarm, automatic switchover, portable and fixed mechanical accessories.

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